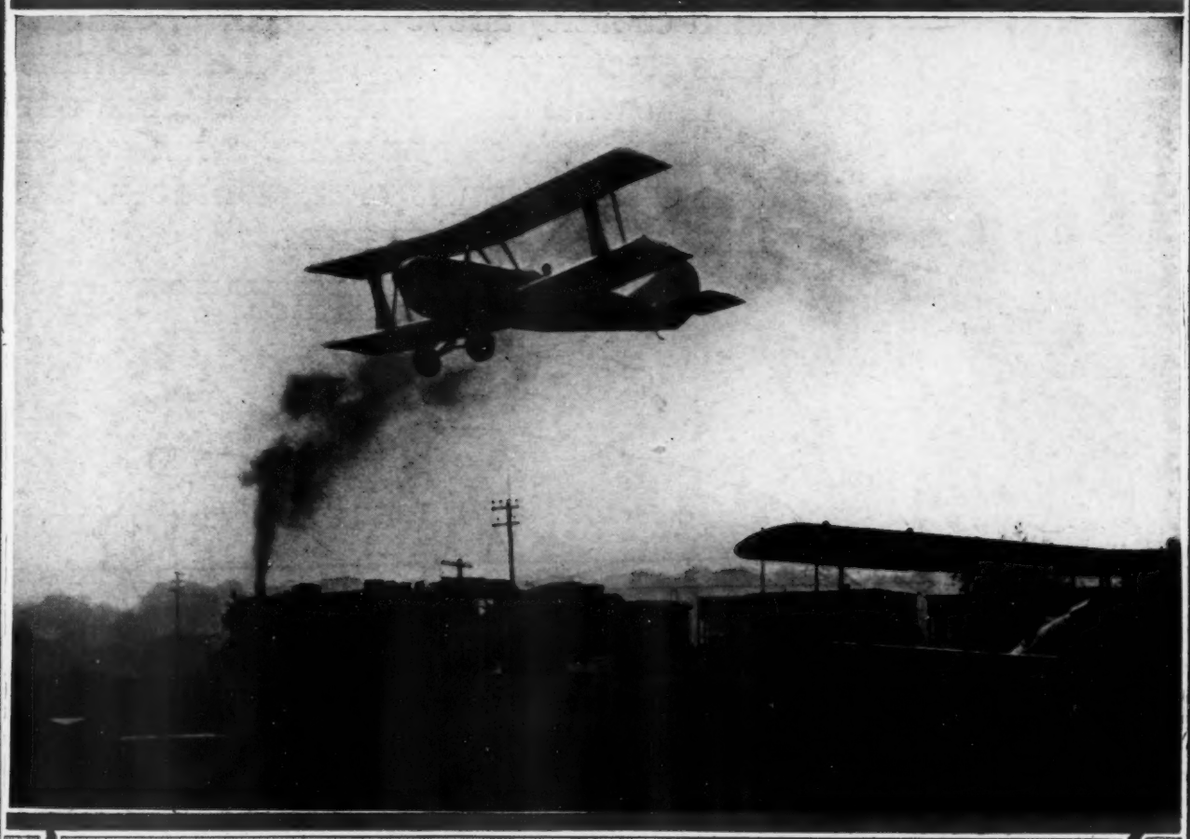
AIR MAIL NIGHT FLYING NUMBER

AVIATION

SEPTEMBER 3, 1923 Issued Weekly PRICE 10 CENTS



Transportation old and new. The Glenn L. Martin Night Mail Plane with Wright engine

VOLUME XV

NUMBER 10

SPECIAL FEATURES

THE EPOCH MAKING AIR MAIL NIGHT FLIGHTS
THE CURTISS NIGHT FLYING MAIL PLANE
THE AEROMARINE NIGHT FLYING MAIL PLANE
THE GLENN L. MARTIN NIGHT FLYING MAIL PLANE

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office at Highland, N. Y. under Act of March 3, 1879.

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SEPTEMBER 3, 1923

AVIATION

VOL. XV. NO. 10

Member of the Audit Bureau of Circulations

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THE GARDNER, MOFFAT COMPANY, Inc., *Publishers*

HIGHLAND, N. Y.

225 FOURTH AVENUE, NEW YORK

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The Liberty Engine Problem

THERE have been indications recently in the plans of the Air Service and to a lesser degree in the Air Mail to overemphasize the importance of the fact that the Liberty engine must be made the backbone of any program.

The Air Service has seven or eight thousand Liberty engines in storage, the surplus left from our war activities. That this engine has demonstrated its excellence no one will dispute. That pilots who have become accustomed to it are partial to its use is only natural. And, also, in these days of insufficient appropriations they may be rightly regarded as a "back log" which can be used to avoid expenditures for new engines. But, keeping in mind these points in its favor, the danger of the situation should be recognized.

There are today only four companies in this country building aeronautical engines. This type of motive power requires large capital investment and heavy charges for experimental development. Unless the industry is encouraged to develop new types of engines, aviation in this country will remain at its status at the end of the war in so far as power plant advances are concerned. And the danger of this condition cannot be too strongly emphasized.

The Navy has received great praise for the encouragement that it has given to manufacturers in their efforts to develop engines of various types and increased powers. But if there is to be only a limited use for these types and the manufacturers are to be always confronted by the Liberty engine reserve stock, there is the immediate danger of a slowing up of our progress.

In the same way, our airplane designers will be inclined to develop their ships around an engine which cannot compete with the latest engines here and abroad. If they do, they will have to overcome the objection of the services that they cannot afford to use new types of engines, of the pilots who are accustomed to the Liberty and of those airplane constructors who are not as much interested in power plant problems as in production orders.

It will be of interest to note the outcome of the rivalry that is to take place in the three types of night-flying air mail planes. Three types of engines are used, one being the Liberty. That there will be a prejudice in favor of the Liberty power plant is a foregone conclusion, but in the final judgment those in charge of the Air Mail can be relied on to choose its equipment on the basis of performance and reliability rather than expediency.

With the Air Service, the question becomes involved by the introduction of the uncertainty as to the kind of engine any possible enemy might employ. In our naval expansion, our battleships were always planned with an eye to what other countries were building. It should be the same with aircraft. If the Liberty engine will serve a given purpose better than any other engine that may be used against it, that fact should control the decision. If not, to use it is a backward step that should not be taken.

The problem of the Liberty engine will receive the scrutiny of Congress along these lines and it will be well to have an open discussion of the various opinions regarding the Liberty engine utilization.

N.A.A. Reorganization

AN important change has just been announced in the government of the National Aeronautic Association. The representation in the future is to be by States and not by districts. This is a great improvement as the arbitrary division of the United States into nine districts, based on military requirements, had no place in a civilian association. The logical unit is the State and the change will make the interest in each group more coherent and definite.

The enlargement of the Board of Governors to fifty-seven, one from each state and five at large, which at first glance appears unwieldy, has the merit of being representative of all localities.

The chapter idea has never appeared to be a satisfactory plan to many who have seen the growth and decline of hundreds of local aero clubs, flying clubs, air boards and other groups that have come into existence through the enthusiasm of the moment and then become quiescent, except for an occasional appearance on a letterhead or in the newspapers. The division of local members into two groups, chapter members and non-chapter members, will also probably cause difficulty as the latter will have little or no direct representation in the affairs of the Association.

It has been found in several cities, that the Association had members who were opposed to the policies of the organizers of the local chapters and did not care to join the local group. As the chapter is the local representative of the Association these members who are interested in the national work of the Association, but opposed to local policies, are left out in the cold. A very much better plan than the present chapter idea can be devised and it is hoped that at St. Louis some more harmonious plan may be suggested.

No Air Conference

AS was confidently predicted by AVIATION, President Coolidge has announced that any air conference for the limitation of aircraft construction is impracticable at this time. The more pressing problems that now confront the European nations in the way of reconstruction, in the view of the President, make it unlikely any serious consideration can be given to the Legion's proposal at present. After the present economic difficulties of European powers are solved the Air Conference ideal may be considered, but not until then.

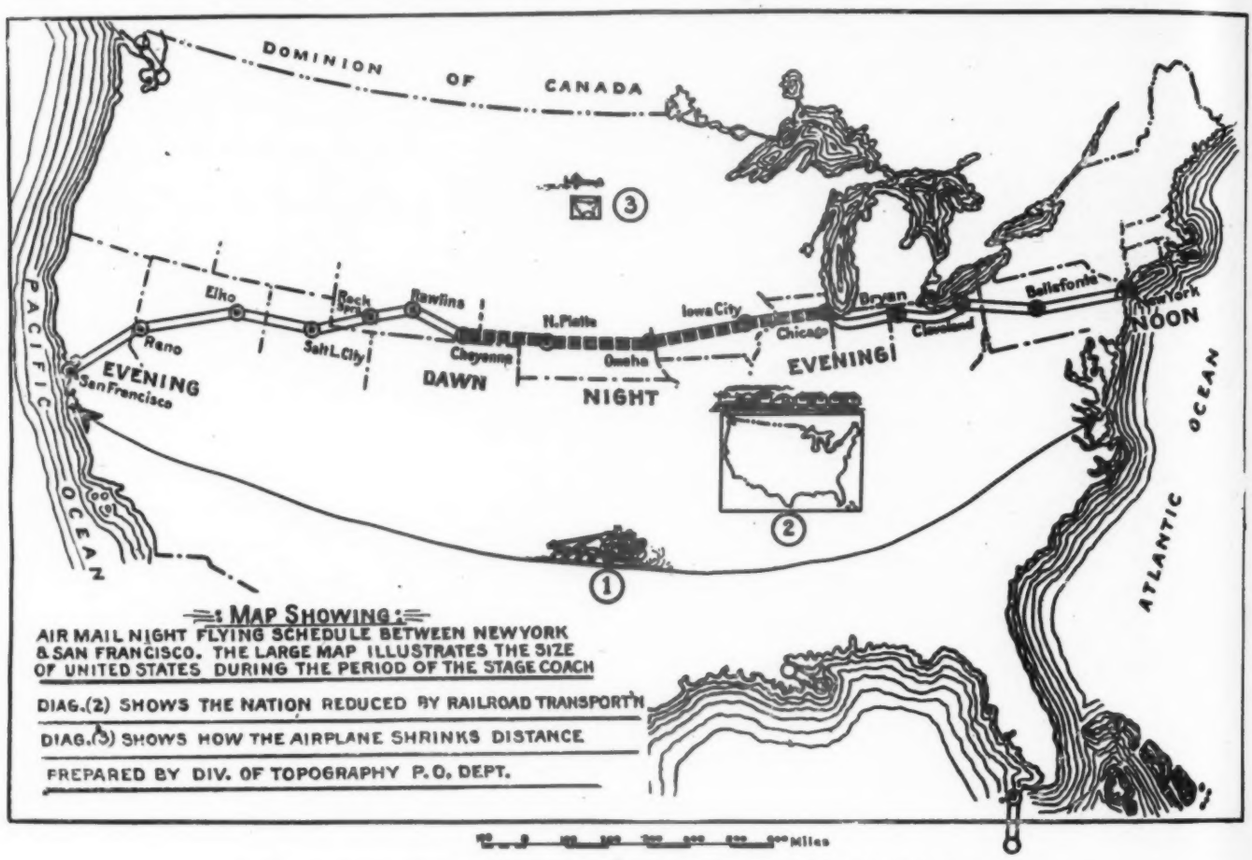
The Epoch Making Night Mail Flights

Mail Planes Maintain Average of 28 hr. for Six Flights Between New York and San Francisco

The United States Air Mail Service concluded on Saturday, Aug. 25, a wonderfully successful four-day demonstration of the practicability of 28 hr. air communication between the Atlantic and Pacific Coasts by relays of mail planes flying day and night.

Particularly conclusive were the night flights over the lighted airway between Chicago and Cheyenne. On this part of the route the pilots proved to the satisfaction of the most skeptical that barring impenetrable fog or unusual storm night planes can be flown with the almost clock-like precision maintained by the service for over 2½ years in its regular daylight flights between New York and San Francisco. As this splendid demonstration of night flying has been made with the regular day flying equipment—the rebuilt DH's, with their high landing speed and other features which make them unsuitable for emergency night landings or for taking off from small fields, when an emergency landing is negotiated. With sufficient modern night flying planes especially designed and built by American manufacturers for the mail service (three new types of which are described elsewhere in this issue), there is every assurance that the air mail will be able to inaugurate and efficiently operate a regular day and night service between the Atlantic and Pacific Coasts and soon reduce the schedule to 24 hr.

Under the conditions imposed upon the Air Mail officials and pilots through lack of planes especially built for night flying the average time for the three westward and three eastward flights begun on Aug. 22, 23 and 24 exceeded the expectations of everyone unfamiliar with the splendid spirit and efficiency of the Air Mail organization, officials, pilots and mechanics. After the Central Division organization had worked for four night and days without rest, Postmaster General New issued instructions cancelling the fifth test originally planned, believing that the results accomplished needed no further emphasis.



How the Air Mail night flying schedule reduces the size of the United States

Maintain 28 Hr. Service

Omitting the east and westbound trips of the first day, during which the planes encountered beyond the night flying area exceptional delays due to fog, the remaining three west and three eastbound trips were flown in the average elapsed time of 28.25, a remarkable approximation of the scheduled time of 28 hr. planned by the Air Mail officials for the night flying experiments. The degree to which the American public has taken for granted exceptional performance by the Air Mail Service is shown by the fact that in reporting these eight experimental flights through four nights and days over a route 2680 miles long, the press has barely mentioned the entire absence of injury to pilot or machine.

The demonstration of practical night flying by the Air Mail Service will prove of inestimable value to commercial aviation in the United States, as it is realized by all who have studied the matter that in night flying lies the future of financially profitable passenger and express business.

The record of the eight flights over the 2680 mile course across the continent follows:

EASTBOUND:

Tuesday—Left San Francisco and reached Laramie; second plane left Omaha and traveled to New York. Laramie to Omaha not flown.

Wednesday—Left San Francisco 5.26 a. m., reached New York 12.22 p. m. Thursday. Time, 27.56.

Thursday—Left San Francisco 6 a. m.; reached New York 11.14 a. m. Friday. Time, 26.14.

Friday—Left San Francisco 5.28 a. m.; reached New York 11.14 a. m. Saturday. Time, 26.17.

WESTBOUND:

Tuesday—Left New York 11.01 a. m.; reached San Francisco 6.24 p. m. Wednesday. Time, 34.23.

Wednesday—Left New York 11.01 a. m.; reached San Francisco 1.45 p. m. Thursday. Time, 29.44.

Thursday—Left New York 10.56 a. m.; arrived San Francisco 1.34 p. m. Friday. Time, 29.38.

Friday—Left New York 11.04 a. m.; reached San Francisco 1.44 p. m. Saturday. Time, 29.40.

The Night Airway

As dusk covered the 885 mile stretch between Chicago and Cheyenne on the evening of Tuesday, Aug. 21, illumination

Paul Henderson, 2nd Ass't Postmaster General in charge of Air Mail Service

of the first night airway in the history of world aviation was begun.

At each of the United States Air Mail fields in Chicago, Iowa City, Omaha, North Platte, and Cheyenne, 36 in. electric arc beacons revolved completely around the horizon three times a minute, casting a 450,000,000 candle power beam 150 miles into the darkness. Another light of equal power flooded the runways of the field, in the center of which, flush with the surface of the ground, but protected by an iron grill was a piercing cluster of red lamps. Upon the roof of the hangar, so lighted as to be visible a thousand feet or more, floated the fabric cone which to the pilot is a key alike to the direction of the wind and its velocity. Other buildings, radio towers and the boundaries of the entire reservation were all outlined from cables carried underground.

At 34 points along the 885 mile way are emergency fields, ranging from fifteen to thirty miles apart and from each of these points an 18 in. incandescent electric beacon, mounted on a 50 ft. tower cast a 5,000,000 candle power beam completely around the horizon every 10 sec. In between these fields, at 3 mile distances acetylene gas beacons of 5,000 candle power flashed 150 times a minute.

Into this path of light, following for the most part a straight line from the Great Lakes to the Rocky Mountains, the mail planes flew at dusk and from it emerged at dawn.

The machinery functioning for this history-making demonstration has been a year in the making. Its similarity to the organization followed in railway operation is marked. A modern railway division is about 250 miles; the Air Mail is 500. A railway division superintendent is concerned with the condition of his tracks and right of way; the flier with the weather at different altitudes along his route. Block signals and switch lamps for the railway are paralleled in the Air Mail by beacons and flood lights. A railroad motive power and rolling stock corresponds to the cargo planes. And in both instances dispatching is similar except that the radio is employed exclusively by the Air Mail.

As the four night planes traversed the electric path from Cheyenne to Chicago at their ordinary speed of 100 mi./hr., the Air Mail superintendents knew their position practically every moment for the radio service is supplemented with telephones at the emergency fields. These planes, while in flight, were in darkness except for navigating lights on the leading edge of the lower wings, red on the starboard and green on the port. Each of the four night flying ships also was equipped with a white light in the tail, wired to flash telegraphic signals on approaching a field in case of necessity.

Altogether, on the transcontinental demonstration, twelve planes were placed in service. In the night route four were utilized, yet in that section, the Department placed ten more machines completely equipped and tuned up for instant emergency service.

Colonel Henderson in Charge

Col. Paul Henderson, Second Assistant Postmaster General, under whose direction preparations for night flying were made, took charge personally at Fort Crook, where the Omaha control of the Air Mail is located. With him were General Superintendent Carl F. Egge and Division Superintendent Colyer. In a letter dated Aug. 21 to General Superintendent Egge, Colonel Henderson said:

"My Dear Mr. Egge:

"Since you and I reached the Central Division of the Air Mail Service on Thursday of last week, I have been greatly impressed with the tremendous amount of work which has been accomplished by the men of the service on this Division.

"It is quite apparent that they have known no hours in their attack on the job to be done. Their industry, enthusiasm and devotion to the duty at hand is certainly inspiring.

"I would like to take this opportunity of congratulating you and, through you, not only all of the field officials in this Division but all of your pilots, mechanics and helpers. I do not think I ever saw more whole-hearted, enthusiastic devotion to duty than is evident at every hand in this Division of the Air Mail Service.

"If we succeed in our five-day trial, the reason for our success will be the tireless effort put forth by these men under Superintendent Colyer's able direction."

The laying out and installation of the lighting system has been under the management of J. V. Magee, an illuminating engineer. The ten pilots chosen to fly the planes over the night route were: F. R. Yager, Jack Knight, J. F. Moore, E. M. Allison, E. F. White, H. T. Lewis, R. G. Page, L. H. Garrison, W. L. Hopson and D. C. Smith. All of these pilots have flown their courses at night. All have made successful emergency landings with no other assistance than that provided by special flood lights installed beneath the lower wings. Since actual preliminary tests began several weeks ago, up to the first official night flight, these pilots had flown over 25,000 miles at night.

The names of the pilots who covered the daylight portions of the flights follow: C. H. Ames, William Blanchfield, Henry G. Boonstra, Paul S. Collins, H. A. Collison, Robert Ellis, C. Eugene Johnson, Paul Scott, J. W. Sharpnack, Art Smth, Dean Smith, Wesley L. Smith, C. K. Vance and Burr H. Winslow.

With Colonel Henderson and Superintendent Egge at the Omaha control on the first night of the tests were several officials and civilians prominent in aviation. Included in the group observing the tests and receiving reports were Dr. George W. Lewis, of the National Advisory Committee for Aeronautics; Charles F. Redden, President, Aeromarine Airways; J. G. Hall of the Curtiss Aeroplane and Motor Co.; Glenn L. Martin, President of the Glenn L. Martin Co.; N. J. Boots of the American Gas Accumulator Co.; M. L. Patterson, Illuminating Engineer for the Sperry Gyroscope Co.

and Luther K. Bell, Secretary of the Aeronautical Chamber of Commerce.

Purposes of Tests

Colonel Henderson issued the following statement on the evening of the first night flight:

"The Post Office Department believes that the Air Mail is putting the airplane to work. It believes that aircraft are primarily useful vehicles and that when they are so regarded the acceptance of commercial flying will be universal. I believe that it is not improper to say that the Air Mail experiments have the sympathetic support of the Administration. Certainly they have the interest of Congress and they should command the constructive curiosity of the country.

"We hope that this five-day trial will lead directly to authorization for a continuous 28-30 hr. night mail service between the Atlantic and the Pacific Coasts. We are hopeful that the demonstration of efficiency, time saving and patronage, as evinced by the thousands of letters carried will result in more substantial financial assistance for aviation from the Government.

"With the operation of a regular night air mail, we are hopeful that the Department can get proper authority to let contracts for the private transportation of the mail beween important centers of population more than 500 miles apart.

"But most of all we hope that this experiment will emphasize the imperative necessity for Congress to enact proper legislation governing civilian aviation and establishing adequate authority for the lighting and control of airways by day and by night for use, not only by the Air Mail, but by private operators."

Colonel Henderson's opinions were strongly indorsed by Rear Admiral W. A. Moffett, Chief of the Bureau of Aeronautics, Navy Department, in a telegram received at the field: "May I extend to you and your personnel our congratulations on the great work you are doing and express the belief that there is no more constructive work taking place in aeronautics today and which I believe will have more to do with showing the way for the practical and successful operation of commercial aviation. Let us hope that the people and Congress will recognize the importance of what the Air Mail is doing by increased appropriations."

On Aug. 24 the Omaha Chamber of Commerce tendered a luncheon in honor of Colonel Henderson.

"Although," Colonel Henderson replied to the congratulations of the toastmaster, "the third day of our four day test has resulted in the rather spectacular connecting up of San Francisco with New York by Air Mail in an elapsed time of 26 hr. 14 min., the true significance of these tests should not be lost sight of.

"Our real purpose in these tests was to find an affirmative answer to the question as to whether or not aircraft might be successfully operated at night. Our success is definite. Aircraft may be operated at night, with a certainty, safety and regularity.

"By the proving of this to be a fact, we have, I believe, opened up the door for a new and wide use of aircraft. The dark hours out of the 24 are those most important to the business man from the point of view of the expeditious transportation of his letters, his money and his merchandise. The airplane has lost much of its potential value until now. Although airplanes run much faster than do trains, except in certain peculiar combinations of distances, part if not all of this advantage over the train has heretofore been lost, due to the fact that the train ran 24 hours a day, the airplane finding it necessary to stay on the ground at nights.

"I really believe that within a relatively short time all important commercial and industrial centers of the United States will be connected up by lighted airways, over which mail, express and other important movements will be made at night, always providing that the distance between such centers exceeds 500 miles and does not exceed 1200 to 1500 miles.

"A train can go 500 miles over night, thus taking to itself a perfect ability to take care of such transportation as may be between centers less than 500 miles apart. However, a train cannot go much more than 500 miles in the dark period of the 24 hours., whereas an airplane can go between one business day and the next from 1000 to as much as 1500 miles.

"There are in the United States scores of potential overnight routes, the outstanding probably being New York and Chicago. Aircraft will fly from New York, leaving after dinner in the evening, arriving in Chicago just before dawn, without doubt.

"Other possible combinations of termini might be:

"Chicago-New Orleans, Chicago-Atlanta, Chicago-Boston, Chicago-Philadelphia, Chicago-Washington, Chicago-Denver, New York-Minneapolis, New York-Milwaukee, New York-St. Louis, New York-Memphis, New York-Louisville, New York-Columbus, New York-Cleveland, Detroit-Toledo, San Francisco-Portland, San Francisco-Seattle, San Francisco-Spokane, San Francisco-San Diego, San Francisco-Salt Lake, New Orleans-El Paso, from Fort Worth and Dallas to Los Angeles, San Diego, Salt Lake City, Denver, Kansas City, Omaha, New Orleans, St. Louis and Memphis.

Photo International

Carl F. Egge, General Superintendent of the Air Mail Service

"Much remains to be learned as to the cost of such a promised service and I believe that we now have enough accurate data on cost to warrant us in saying that with postage rates well within reason, service such as is suggested may be made practically, if not wholly, self-supporting.

"I hope that what we have done and what we may be able to do will appeal to the imagination of the American business man, because we need—from this date forward—the active, energetic cooperation of the American business man, first, because it is the American business man that we are attempting to serve. Second, the American business man will be able to help us greatly in procuring from Congress the moral and financial support necessary to a continued successful development of this new angle of our attempt to adapt the airplane to peace-time pursuits.

"Incidentally, if our dreams for the future may be made into reality, we cannot help but automatically create a valuable air reserve in the shape of aircraft and trained, experienced pilots, mechanics and operators."

Colonel Henderson then read the following telegram from Postmaster General New: "President Coolidge congratulates Department for achievement demonstrating 28 hr. Air Mail Service from coast to coast."

Colonel Henderson also read the following telegram of congratulations from Representative Martin B. Madden of Il-

linois, Chairman of the House Appropriations Committee; "I have been watching the transcontinental Air Mail tests with intense interest, and am delighted with the success attained. Your constant and intelligent devotion to this work and its successful outcome has attracted and elicited nation-wide attention and commendation. The delivery of mail between New York and San Francisco in 28 hr. is a remarkable achievement and puts the American Air Mail Service at the top of the world. Accept and convey my congratulations to your associates."

Postmaster General Harry S. New, who vigorously supported the night flying tests

Claire K. Vance, one of the Pacific Division pilots who flew in the four day tests, mailed to the editor of AVIATION a letter dated Aug. 22 and postmarked at the San Francisco post office 1.30 a. m. Aug. 22 which was received at the office of AVIATION at 3.30 p. m. Aug. 23. Mr. Vance's letter follows:

"I am taking this opportunity to send my regards by our night flying schedule now in effect for this week.

"I would be pleased to have an answer by return mail in order to ascertain if we are making any speed.

"Hope to see you at the St. Louis meet."

Acetylene Beacons Outline Airway

The night mail route between Chicago and Cheyenne is lighted at intervals of three miles by 250 American Gas Accumulator Co. acetylene beacons, with a visibility of 8 to 12 miles according to weather conditions.

The A.G.A. beacons flash 150 times per min. and are independent of human care for four months. An acetylene gas tank and pilot light are fitted with a valve sensitive not only to the sun, but to indirect daylight as well. At night fall the lights normally begin to function, but if, during the daytime a storm should arise and the sky become darkened, the beacon is automatically lighted.

The A.G.A. aviation beacon is a development of the highway lighthouse familiar to automobilists in the United States. Its first application to night flying lighting experiments was at the instance of the British Air Ministry.

In addition to the short-range aviation beacons strung over the prairies for approximately a thousand miles, the company has installed for the Air Mail more than 100 acetylene field limitation lights, one being placed at each corner of from 25 to 30 emergency fields. These are known as the rapid flash type of beacon, showing a light 250 times a min.

The American Gas Accumulator Co. has also installed at the Omaha Air Mail field an improved day and night ground wind indicator, the wings of which form the letter T. When illuminated at night it gives the wind direction to the pilot at a distance of three to five miles. It is also operated with an acetylene gas and sun valve.

The ground wind indicator as originally developed for the Air Mail Service was described in the Jan. 29 issue of AVIATION. Since then improvements have been made and the indicator proved of great value to the pilots landing at Omaha during the night tests.

Sperry Searchlight Guides Fliers

The five great Sperry beacons which radiate a 450,000,000 candle power beam for a radius under ideal atmospheric conditions of 150 miles from Chicago, Iowa City, Omaha, North Platte and Cheyenne, have been visible to all of the men who have thus far flown the night route for distances in excess of 100 miles, and some pilots have been so certain of their course as to assert that all intermediate lights were unnecessary.

Arc lights of similar candlepower are used at each of the main fields mentioned for floodlighting when the landings are actually taking place. The thousands who thronged these fields have commented on the peculiar illusions created by these powerful lamps. The beam of the beacon for instance, seems to shoot right into the ground a few hundred yards from the 35 ft. tower, whereas, set at three-quarters of one degree above the horizon, it has a sweep of 150 miles. Standing on the platform itself, the beam appears to end abruptly at about 800 yd., but pilots have flown out the beam for a hundred miles or more and the illusion still persists when looking along, not into, the line of light. Again the great drum on the platform revolves so slowly that a child may keep pace with it. Yet it has been figured out by M. L. Patterson, Special Engineer of the Sperry Gyroscope Co. of Brooklyn, N. Y., that 100 miles out, the light is pursuing the line of the horizon at the astounding rate of 2100 miles a minute.

The Sperry night mail beacons have 3 ft. lenses. They are a development of lights of similiar type first used during the World War by the military commands of Paris and London in seach of German air raiders and also extensively used by the U. S. Government.

Source of Light

"The source of light for the Sperry 450,000,000 candle power beacons," said Mr. Patterson, while witnessing the tests at Omaha, "is an electric arc consuming 150 amperes at 110 volts direct current, or the power required for 400 standard 40 watt 16 candle power incandescent bulbs. Yet these bulbs would give a total of but 6400 candle power, whereas the Sperry lamp's effulgence is 450,000,000. The tremendous intensity of the light is obtained from a gas which is generated and confined in a small deep crater of the positive carbon. The discovery of means of generating and utilizing this gas was made by Elmer A. Sperry, and its application to searchlights was of untold value to the Army and Navy during the war. Over a thousand of these lights are in American military and naval service. This service is now made available to commercial aviation.

"The quality of light and its intensity are, in proportion, about the same as that given off by the noon sun on a clear day, the volume of the light, of course, being infinitely less. It is the richness of the light in the blue-white rays that accounts for its remarkable penetration, especially upon very dark or misty nights."

The Glenn L. Martin Night Mail Plane

Powered with the Wright E4 200 hp. Engine, this Ship Has Shown Excellent Performance in Flight Tests

In developing a special plane for night flying on the U. S. Air Mail route, it was evident to The Glenn L. Martin Co. that a machine offering the maximum safety to the pilot and the greatest economy in operation was required.

An airplane designed for night flying must be capable of landing at a very low speed and be so ruggedly constructed that it can withstand the roughest kind of landings on unimproved fields in darkness. In addition, it must be stable, easily maneuvered and free from any erratic flying tendencies. Simplicity of design and accessibility must also be incorporated.

A reliable power plant of economical operation was considered of paramount importance and the Martin Co. selected the Wright E4 engine for its mail plane. This engine is rated at 200 hp. and in tests conducted by the Bureau of Aeronautics it developed an average of 204 hp. for a period of 535 hr.

The Glenn L. Martin night mail plane with Wright E4 200 hp. engine

Performance Data

The Martin Night Mail plane recently completed and tested, has fulfilled and exceeded all expectations of the designers. It developed a high speed over a measured course of 105.5 mi./hr. with a landing speed of 38 mi./hr. An altitude of 15,000 ft. was attained without reaching ceiling. With full tanks and 150 lb. of mail load it climbed to 6000 ft. in 11 min. and with 715 lb. of mail load reached 3600 ft. in 10 min. During the flying trials the plane demonstrated its ability to execute all maneuvers such as loops, Immelman turns, etc., with ease and exactness. It was found impossible to hold this machine in a spin, and in stalls there was no tendency to side slip.

Details of Construction

The Martin Night Mail is a biplane of sturdy construction. The fuselage is rectangular and veneer covered. The pilot sits well back of the wings about midway of the fuselage. His cockpit is roomy and every consideration has been given to the pilot's comfort and ease of control. In front of the cockpit is the mail compartment in the upper part of the fuselage. It has approximately 31 cu. ft. of space sufficient for 600 lb. of pouched mail. Below the mail compartment are located the two gasoline tanks with a combined capacity of 64 gal. The cruising radius is 6 hr.

The engine is mounted on ash bearers supported by a tubular steel structure attached to the longerons and front bulkhead of the fuselage. The radiator is directly below the engine and completely cowled in with the exception of the front cooling surface. The radiator shutter is a novel trap-door arrangement with a positive rack-and-pinion control in the cockpit. This installation has proved exceptionally satisfactory and permits of easy replacement. The radiator is so located that in case of the plane nosing over it cannot come in contact with the ground.

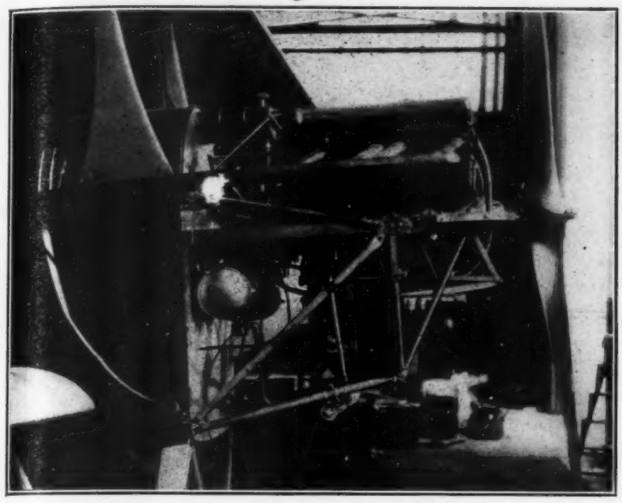
A 5 gal. oil tank is located on the front bulkhead at the rear and below the engine. Between the oil tank and the engine is a special oil radiator which insures the proper oil temperature. An aluminum fire wall separates the engine from the mail compartment and fuel tanks.

The cowling is arranged to allow quick accessibility to all parts of the engine. On each side are large hinged doors held in place by tension fasteners. By swinging open these doors access is had to all oil and water piping, controls, ignition wiring, etc.

Wings and Tail Surfaces

A large portion of the unusual efficiency of the Martin Mail plane is due to the wing airfoil used. This is a recent development of the Martin engineering staff. It is a thick section—known as the Martin No. 15. The wing beams are of the box type, built up of spruce with plywood sides. The typical Martin type built-up spruce ribs are used. There are two lower wing sections, each attached to the bottom of the fuselage. The upper wing is in three sections, there being a narrow cabane section the width of the fuselage and the two outer sections which are attached to this. The cabane section is supported over the fuselage by two "picture-frame"

struts. Between the outer sections only two struts are used—one on each side. These struts are "hour-glass" shaped, built up on the "N" strut order and covered with plywood. The interplane bracing is composed of four streamline rods on each side. There are four ailerons, the two upper ones being balanced with wind vanes.



Engine mounting of Glenn L. Martin night mail plane

The tail surfaces are of the same construction as the wings. The rudder is balanced and the stabilizer adjustable from the cockpit.

Landing Gear

The landing gear being one of the most important parts in a commercial plane owing to the possibility of landings in unimproved fields, is made wide and very rugged. It is of steel tubing with large aluminum alloy castings and riveted and welded steel fittings. The axle is the center hinged type. The safety factor in the landing gear has been kept very high to meet all contingencies. The wheels are 30 x 5.

Controls

It was in the flying controls where many opportunities were found for decided improvement, especially for the sake of safety. There is not a control pulley in the entire plane. These pulleys have been a worry to pilots ever since the beginning of aviation because of the wear on the cables. In the Martin Night Mail plane every cable runs in a straight line and the controlled parts operated by levers and bell cranks. In this way positive action is assured at all times with no wear on the cables.

Another feature of considerable advantage when taxiing is a steerable tail skid operating with the rudder.

SPECIFICATIONS

Wing span, 42 ft.
Length, overall, 28 ft.
Height, 12 ft. 1 in.
Gap, 6 ft.
Chord, 5 ft. 4 in.
Wing area, including ailerons, 430 sq. ft.
Stabilizer, 30 sq. ft.
Elevator, 25 sq. ft.
Rudder, 12 sq. ft.
Fin, 10 sq. ft.
High speed, 105.5 mi./hr.
Low speed, 38 mi./hr.
Altitude in 11 min., 6,000 ft.
Ceiling absolute, 17,000 ft.
Weight, empty, 2,020 lb.

Atlantic Airways, Inc.

Atlantic Airways, Inc. of Hingham, Mass. is at present operating four planes: two converted 6-place HS2L boats, one Curtiss MF boat and an Aeromarine 39B seaplane. Three additional HS boats and an MF are held in reserve. All of this equipment was new last spring, and the ships flying have been licensed by the state of Massachusetts.

Gas, oil and spare parts are available at the company's base, which is equipped with a well-outfitted shop and specially built marine railway for handling planes.

Hundreds of passenger-miles have been flown and a number of students graduated this season without mishap. Conservative, constructive flying is the policy of this airways company.

Gliding Progress in Germany

As a result of the successes attained in 1921 opinion in gliding circles became divided into two schools, writes Dr. G. Lachmann in a German publication. The first school believes mainly in what is known as static soaring—or the use of up-currents, while the second advocates the development of "dynamic" soaring—otherwise soaring by the use of the "internal work of the wind." The static school aims at speed, whereas the dynamic school devotes its attention to the design of machines with variable angle wings, etc., with a view to the utilization of what is known as the "Knoller-Betz" effect.

After the 1921 Rhoen competition the honors stood fairly evenly divided as between the two schools. (Klemperer's 13 min. flight, and Marten's 15 min. flight on fixed wing machines using rising currents, compared with 21 min. by Harth which was said to be the result of the use of gust energy.)

On the whole the evidence of more recent tests is in favor of the static school. There is no doubt that flight with the aid of gust energy is possible to some extent and has been achieved to some degree; and there seems to be some reason to suppose that the effect of the natural turbulence of a real wind is to produce an amelioration in the resistance of a full sized machine as compared to that observed on a model in a steady current in the wind-channel. But the general conclusion is that the static or up-current effect is so far the main source of soaring energy.

Of the four factors which are of importance in soaring—ground conditions, wind, pilot and machine, the first two appear to be of the greatest importance. Of the remaining two the pilot is probably of more importance than the machine, as a good pilot is more likely to be successful on a poor machine than is a poor pilot on a good one. Nevertheless the qualities of the machine are of great importance, since they put a definite limit to the conditions under which flight is possible.

The result of experience gained up to the present in the design of machines has led, as was the case with power-driven engines, to a general standardization of a type which is characterized by cantilever wings of thick section and high aspect ratio, mounted above a short fuselage, an entirely movable tail plane, and an undercarriage of the most rudimentary type possible. The wing plan is in general rectangular, and the full thickness of section is maintained to very near the wing-tip, as it has been found that thinning at the tip does not lead to good results. Thick sections are held to be preferable both as giving a lower sinking speed over a wider speed range, and as being less apt to stall suddenly than are thin sections.

Fuselages are nearly all of plywood construction, and it has been found that attempts to build very carefully streamlined bodies—such as that of the Hannover "Greif"—do not lead to results commensurate with the extra cost of producing them. The mounting of the wings on the top of the body proves to give better results than any other. The parasol arrangement with a gap between wing and body is less satisfactory. A good all-round view for the pilot is of great importance.

The majority of machines had standard airplane controls. Forms of warp were successfully used instead of ailerons in several machines, and in some cases wings of variable incidence were used in conjunction with a fixed tail plane to give force and control. Obviously quicker and more powerful action can thus be obtained, but there are obvious structural and operating difficulties involved.

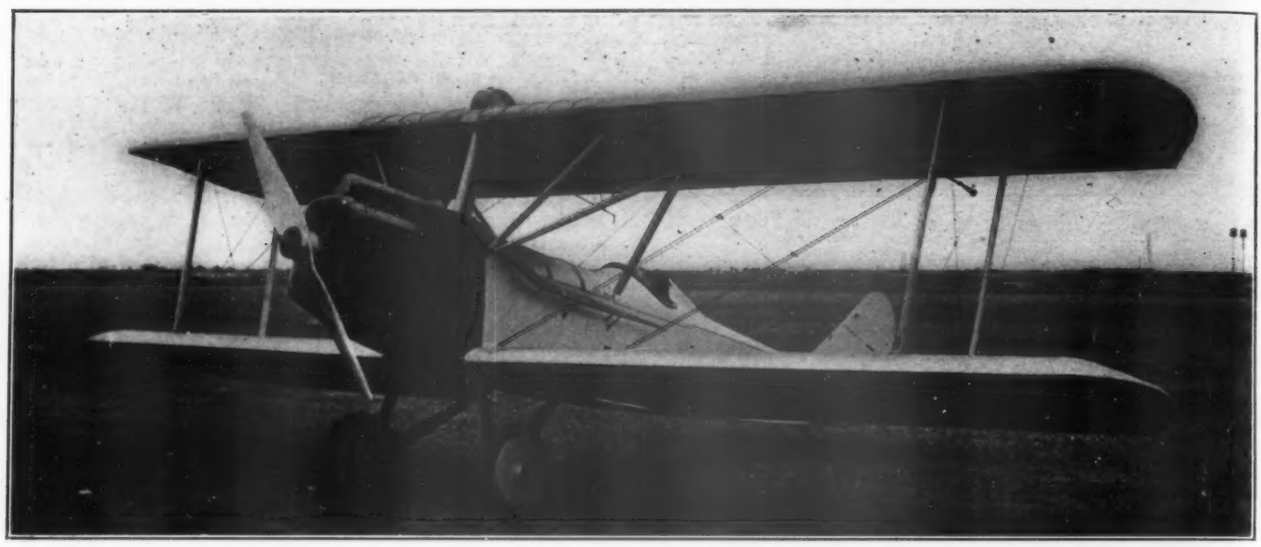
There was relatively little variation in the size of rudder employed throughout all the machines. The average rudder area was ½ sq. m. at 3.2 m. from the center of gravity, and in most cases the rudder control was inadequate.

The Curtiss Night Mail Plane

A Wide Range of Economical Operation is Attained With the C6 Engine and 163 hp.

During the past few months the Curtiss Aeroplane & Motor Co., Inc., has been developing for the Postoffice Department a mail plane with characteristics making it particularly suitable for night flying, to be used in the central lap of the cross-Continental mail service just established.

The first plane of the three being constructed has been completed and during the latter part of August was undergoing trials at Curtiss Field, Garden City, N. Y. The second two machines will probably be completed early in September.



The Curtiss Night Mail Plane with Curtiss C6 163 hp. engine

The Curtiss night mail plane is of the biplane type, using U.S.A.27 aerofoil section. Its general characteristics are as follows:

CHARACTERISTICS OF CURTISS NIGHT MAIL PLANE

Total length, 26 ft. 11 in.
Span upper wing, 33 ft. 0 in.
Span lower wing, 33 ft. 0 in.
Cord upper wing, 6 ft. 0 in.
Cord lower wing, 6 ft. 0 in.
Gap, 6 ft. 0 in.
Height overall, 10 ft. 3 in.
Total wing surface, 364.84 sq. ft.
Dihedral, 1½ deg.
Sweepback, 5 deg.
Stagger, none
Incidence, 2 deg.
Weight empty, 1704 lb.
Useful load (freight or passengers), normal 300 lb. (500 lb. max.)
Fuel and crew, 520 lb.
Total load carried, 820 lb.
Weight loaded, 2524 lb.
Weight of plane per b.hp., 10.45 lb.
Total load per b.hp., 15.5 lb.
Weight carried per square foot wing surface, 6.91 lb.
Propeller pitch, —
Propeller dimensions, 9 ft. dia.
Metal employed (Reed propeller), duralumin
Maximum speed, 106 mi./hr.
Minimum speed, 44 mi./hr.
Landing speed, 44 mi./hr.
Climbing speed, 800 ft./min. (ground)—5600 ft. in 10 min.
Ceiling, 14000 ft. (12000 ft. service)
Gliding angle, 1 in 8
Type of motor, C6 (163 b.hp.)
Number of cylinders, 6
Bore, 4½ in.
Stroke, 6 in.
R./min. 1750
Lubrication, type of pump, gear
Cooling—air or water, wing radiators
Consumption of fuel per hour (average speed), .50 lb./bhp./hr.
Consumption of oil per hour (average speed), 0.03 lb./bhp./hr.
Magneto type, high tension
Carburetor, Zenith
Grade of fuel used, aviation gas
Number of hours service before overhaul, 100
Approximate life of motor, 500
Capacity of fuel tanks,, 48 gal.
Capacity of oil tanks, —
Range of action, 3½ hr. full throttle—5 hr. cruising.

Performance and Weights

The trials of the plane, carrying specified 300 lb. mail load, show the maximum speed to be 106 mi./hr., with a minimum speed of 44 mi./hr. and an absolute ceiling of 14,000 ft.

The Curtiss C6 engine at 163 hp. is used. The gasoline tank capacity is 48 ga., which with the high efficiency of the plane permits a range of action of 3½ hr. at full throttle, or approximately 5 hr. at cruising speed of 85 mi./hr. The power loading is 10.45 lb./hp. and the wing loading is 6.91 lb./hp.

Special Features

A feature of the plane is the construction of the upper center section metal wing panel, in which is located the fuel tank and on which are installed Curtiss wing type radiators.

The construction of this panel offers several very distinct advantages, viz., low head resistance, due to the use of wing type radiators, reliability of fuel system on account of the use of gravity feed entirely, without the necessity for a gasoline pump, and the desirable feature of having the gasoline outside of the fuselage.

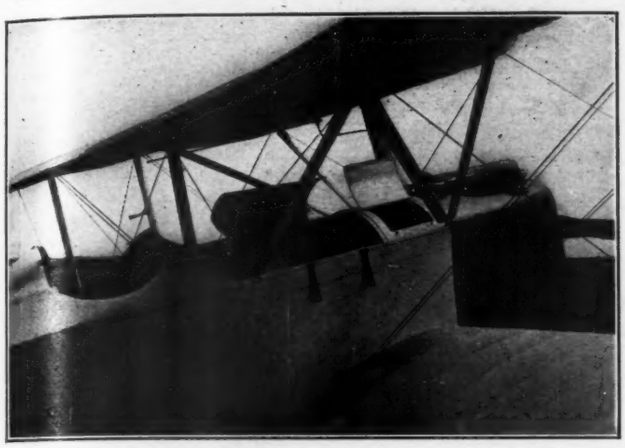
A Reed duralumin propeller of high efficiency manufactured by the Curtiss Co. is used which, on account of the fact that it cannot be injured in flying through rain or hail, adds greatly to the reliability of the plane. On this account it may be considered to have the maximum durability possible for a propeller, thus increasing the economy of upkeep of the plane.

Searchlights are to be installed at the tips of the lower panel to make possible night landings. Aluminum conduits for the wiring for these lights have been installed in the panels so as to facilitate installation of the lights and in case of repair.

A generous mail compartment has been provided with a hinged cover which is particularly easy to open. This feature as well as the strong veneer walkways provided on the top

surface of each lower wing near the mail compartment, and good clearance between the upper panel and the fuselage, makes for simple and expeditious loading and unloading of mail.

One of the most noteworthy features of the plane, which makes it particularly adaptable to the service for which it was intended, is the great economy of operation, as will be seen from the performance above outlined. Although the specifications under which the machine was designed only call



Mail compartment of Curtiss night mail plane

for a mail load of 300 lb., the efficiency of the machine has proven such that 500 lb. of mail has satisfactorily been carried in flying trials. This weight carrying ability and economy is accomplished by using the C6 engine giving 163 hp. with an economy of fuel consumption which provides a flight range of 3½ hr., or 360 miles, with wide open throttle, and 5 hr., or 425 miles, at cruising speed.

An essential feature of a night mail plane is wide speed range. This is provided in the Curtiss design in its 44 mi./hr. minimum and 106 mi./hr. maximum speed. This creditable high speed makes economical operation possible, and the low speed enables the plane to land on small fields, and thus greatly facilitates night landings.

The desirable performance characteristics of the plane are made possible by a clean-cut design throughout, with particular attention to streamlining; an efficient wing section, enclosed in which in the center section panel are the tanks; wing type radiators, and by the use of an efficient metal propeller.

The trials thus far conducted have led the designers to express confidence that this plane will add materially to the success of the cross-Continent mail route just established.

Detroit-Cleveland Service Popular

C. F. Redden, President of Aeromarine Airways, who has had personal charge of the Detroit-Cleveland service this summer, arrived in New York, Aug. 22, in connection with plans for the extension of the Key West-Havana service this fall.

The Aeromarine Co. is operating two flying boats each way daily between Detroit and Cleveland. The traveling public is now buying flight tickets "over the counter" at both their offices, in the same manner as they buy railroad and steamship tickets. Telephone reservations are made daily by the various clubs and hotels in both cities. Many prominent business concerns are using this method of transportation almost exclusively between these two points, because of the great saving in time, it taking but 90 min. by air as against about 6 hr. by rail.

A careful analysis has shown that practically all of the passengers using the Aeromarine service between Detroit and Cleveland are doing so because of its economic advantages rather than on account of curiosity or the pleasurable experience of an airplane flight.

France Extending Subsidized Lines

A convention was entered into by the Director of the French Service of Aerial Navigation, on behalf of the Government, with the French Roumanian Company to determine the conditions under which the Government will subsidize a regular service between Paris, Prague and Constantinople, and between Paris and Warsaw. The French and Dutch Governments have approved the text of a provisional arrangement for air-lines between France and Holland. The first trip was made on April 30.

Barbot Sets New Record

Georges Barbot, the French aviator, flying in a motorless airplane, on Aug. 22 covered 212 km. (approximately 132.5 miles) over an officially measured circuit. This is a record distance for this type of plane. Barbot remained in the air six hr., four min. and twenty-one sec.

Success of Australian Airways

The Western Australian Airways which operate a daily aerial mail and passenger service between Geraldton and Dergy, a round trip of about 3000 miles, is equipped with Bristol "Tourer" machines. The equipment of this company was recently inspected by the Chief Inspector of the Australian Civil Aviation Department, and he reported it to be in very good order, considering the work they have done, and stated that the service is an undoubted success.

One machine that had done over 500 hr. of flying was stripped and very thoroughly inspected, and was found to be absolutely sound and capable of almost indefinite service.

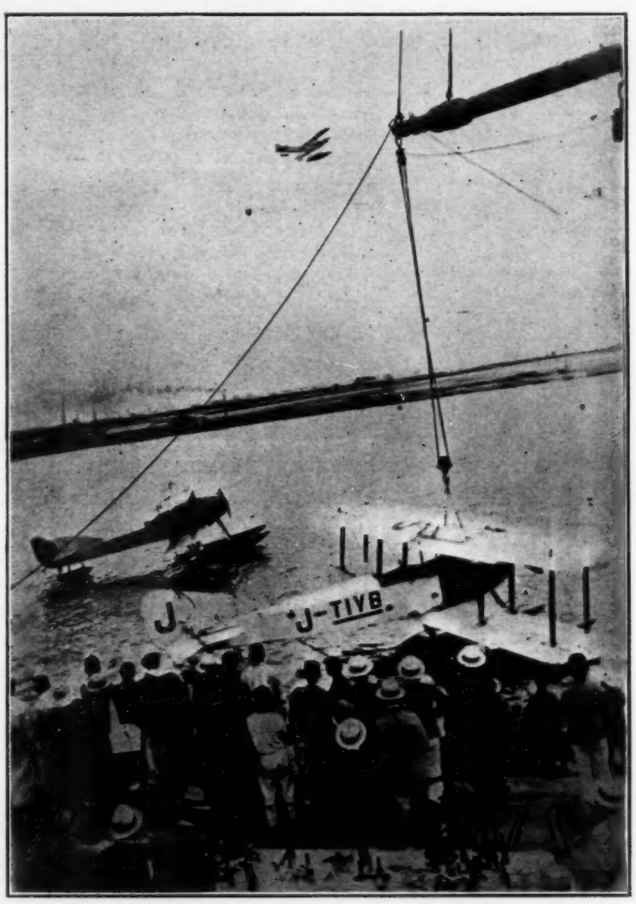


Photo International

Commercial aviation in Japan—Inauguration of a passenger service between Osaka and Beppu, a fashionable seaside resort

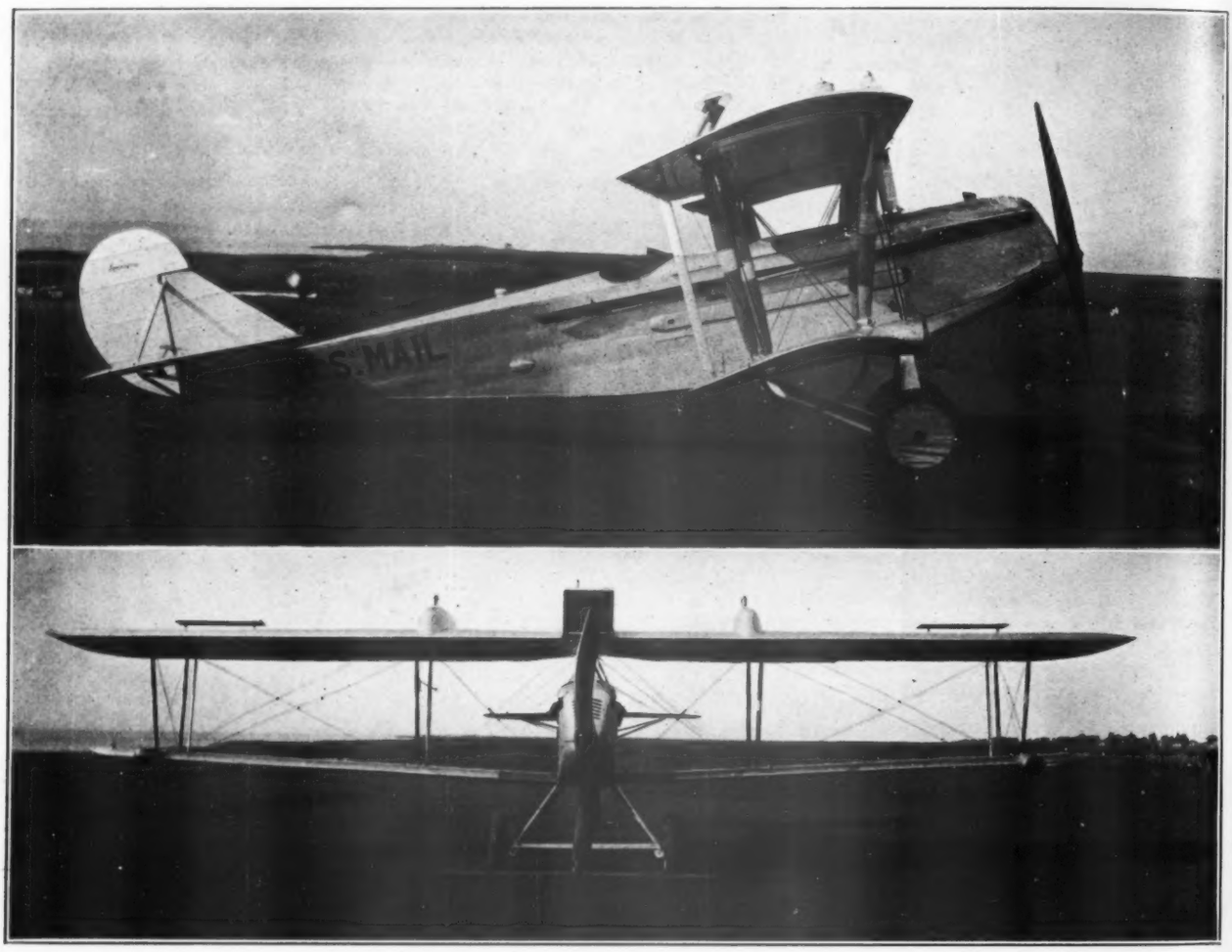
The Aeromarine Night Mail Plane

All Metal Fuselage, High Lift Wings and Liberty Engine Are Distinguishing Features of New Ship

The Aeromarine Plane & Motor Co., designed and constructed the airplane described below for the U. S. Air Mail Service in 122 days from date of contract.

The practical requirements of the service for which it was to be used were ascertained from the various Air Mail officials and pilots in New York, Cleveland and Chicago by Paul G. Zimmermann, chief airplane engineer of the Aeromarine Co. This mass of data was digested and the airplane designed. If the requirements of night flying service are successfully met by the airplane it is because of the very valuable data thus obtained.

Span	50 ft.
Length overall	32 ft. 11 in.
Height overall	12 ft. 9 in.
Wing area	540 sq. ft.
Mail compartment capacity	45 cu. ft.
Gas tank (2)	100 gal.
Oil tank capacity	12 gal.



Side and front views of the Aeromarine Night Mail Plane (400 hp. Liberty engine), built for the U. S. Air Mail Service

The airplane is a two bay biplane the span of the upper wings being larger than the lower wings. Ailerons are used on all four wings. Two 50 gal. gasoline tanks are located in the upper panels over each pair of inside wing struts. The radiator used is also attached to the upper panel, at the center, directly over the motor, but entirely out of the pilots line of vision. The fuselage and tail surfaces are constructed of 17S alloy while the wings are built of spruce covered with doped cotton. A high compression 400 hp. Liberty engine is used

The specifications and special features follow:

Weight empty	
With water	2875 lb.
Weight loaded	4450 lb.
Normal load	
Mail	600 lb.
Gas and oil	665 lb.
Pilot	180 lb.
Equipment Pyrene	35 lb.
Equipment electrical	95 lb.
	1575 lb.
High speed	116 mi./hr.
Low speed	44 mi./hr.
Climb with mail load of 600 lb.	6500 ft. in 10 min.
Service ceiling	17000 ft.

Aerodynamical Data

Aeromarine No. 2A Wing Curve is used on both wings. This curve is an improvement over Aeromarine No. 2 curve, published in AVIATION of March 13, 1922. The curve was originally designed for use on Air Mail type WM (converted

DH4) and carried mail load of 800 lb. (was tested successfully up to load of 1000 lb.)

Upper wing has chord of 7 ft. and span of 50 ft., while *lower one* has chord of 5 ft. and span of 45 ft. 10 in. Two wings are staggered so that rear struts are perpendicular to the chord.

This arrangement of wings was used first on Aeromarine Model AMC flying boat with complete satisfaction. It is particularly advantageous when good load carrying capacity and climb are required. Incidentally this arrangement allows better field of view for the pilot.

Light wing loading of 8.2 lb./sq. ft. in connection with high lift aerofoil section insured landing speed as low as 45 mi./hr. Besides safety in landing it makes take off and flying much safer. Experience shows that airplanes of this kind do not spin readily, and allow many of the pilot's errors to pass unpunished.

For the airplane designed for night flying, as this one is, the above qualities are invaluable. Moreover light wing landing allows the airplane to carry loads far in excess of ordinary if required in emergency.

Ailerons are fitted on both upper and lower wings and have very big area (13 per cent of wing area). This was needed to provide effective action at slow landing speed of this airplane.

Ailerons are balanced by means of small balancing panels (aero type,) so that their operation is light, despite the big area.

Wing bracing is of the two bay type with cabane over the fuselage. Employment of the struts of Navy No. 1 Section and of streamline wires for bracing results in very small parasite resistance of these parts.

Landing gear is very wide, so that wheels and shock absorber units are entirely out of slipstream of propeller. Mutual location of landing gear parts is such as to cut interference of parts, and consequently their resistance to a minimum.

Fuselage is narrow to decrease resistance and improve pilot's vision. Sides of fuselage are very clean, no control horns or similar projections breaking the flow of the air. Streamline cowl over the engine, and wedge shaped fuselage in the rear result in very good streamline shape. Very little resistance is produced by this fuselage.

Structural Advantages

Thickness of Aeromarine No. 2 curve, and big chord of upper wing allow very deep and strong beams to be used. Very conservative calculations show the factor of safety of 7 for the front beams. Fittings, wires and struts have sufficient excess of strength to allow the full strength of beams to be developed.

Fuselage of plate girder (semi-monocoque) construction is built of duralumin (17S alloy) sheets entirely. Covering is 1/32 in. thick, frames and bulkheads vary from 1/32 in. to 1/16 in., and the longerons of angle sectionare 1/16 in. thick. At the openings, such as pilot's cockpit and mail compartment, heavy reinforcements of 1/16 in. duralumin are used to insure the strength.

Triangular shape of the fuselage back of the wings results in considerable saving of weight without any sacrifice in strength.

Wings are constructed of heavy I beams of spruce and built up spruce ribs. The peculiarity of the design is in that the center lines of front and rear beams are in line with center lines of the struts. This resulted in very simple and effective type of strut fittings used, and in the complete elimination of offset bending moments in any direction. It is probably first time that such results were attained in case of the machine with staggered wings.

Landing gear has tread of 7 ft. 6 in., and is constructed of steel tubing entirely. The design and construction are such that all struts are pin jointed, and that any important member can be removed without taking apart whole landing gear. Wheels are equipped with straight side tires 8 in. x 36 in.

Throughout the construction care was taken to have all parts sturdy and reliable, and the machine can be classified as "Heavy Duty Airplane".

Service and Maintenance

Good aerodynamically and structurally, as the airplane is, its real value becomes apparent only in service conditions. Throughout the design the practical use of the ship and ease of maintenance were kept in mind. Ship as constructed has very few parts and most of them can be removed separately without disturbing other parts, as explained below in more detail.

Motor installation is made of steel tubing and wooden engine beds, the latter being chosen on account of its vibration absorbing qualities. The streamline cowl is made in four parts each of which is held by long hinge pins and can be removed separately. Upon the removal of the cowl the engine is left exposed on all sides, allowing all repairs to be made conveniently. Good clearance is left between the engine and fuselage proper, allowing easy access to distributor heads, generator and water pump. Here are located also gasoline strainers and engine controls.

Oil tank is located under the engine and acts at the same time as oil radiator. The amount of cooling can be regulated by opening or closing of the doors provided for that purpose in the lower cowl. With closed doors, in very cold weather, the oil will be heated from the engine crankcase.

Radiator is at the leading edge of upper wing and is supported by two brackets on the wing. It can be removed by undoing three nuts and two water connections. Narrow slot is left between the radiator and the wing proper in order to increase the flow of air through lower part of the core, and also to increase the lift of the wing just back of the radiator. Two straight vertical water pipes connect motor with the radiator. Difference in level between the motor and radiator results in a thermo-syphonic action which greatly assists the water pump and results in more active water circulation.

The radiator is equipped with Aeromarine shutters allowing pilot to control water temperature in any weather.

Two gasoline tanks of 50 gal. capacity each are located on upper wing, the gravity feed with 3 ft. to 4½ ft. head can be depended to give reliable operation under all conditions. The tanks are welded of aluminum alloy sheet and have barrel shape. Streamline cowls in front and rear of the tank, and fabric covering over the tank give all installation very neat appearance and cut the parasite resistance to almost negligible figure. Gasoline gages, furnished by the Pioneer Co., are located on under side of upper wing, near the fuselage, where they are clearly visible to pilot.

Tail surfaces can be removed from the fuselage as a unit by undoing five nuts, yet when in place will stay intact in case of failure of 50 per cent of connections. Stabilizer is adjustable from the pilot's cockpit.

Safety Features

In view of the use of this ship on a night service, special attention was paid in its design to safety features. These may be summarized as follows:

(A) Light wing loading and high lift wing curve make the machine practically spin-proof.

(B) Gasoline tanks, being located on the wing, will fall clear off the motor in case of crash, and so there will be no danger of fire.

(C) The safety from fire is also emphasized by the fact that there are no gasoline pipes or connections of any kind in the fuselage. All pipes leading from tanks in the wings along cabane struts directly to motor installation.

(D) The engine cowls have many openings and are well ventilated to avoid collection of gasoline and oil, and formation of explosive vapors.

(E) By mere opening of a valve the pilot can spray the motor and carburetors with pyrene from 3 gal. tank, under pressure. This allows the extinguishing of any fire during the flight at its very origin.

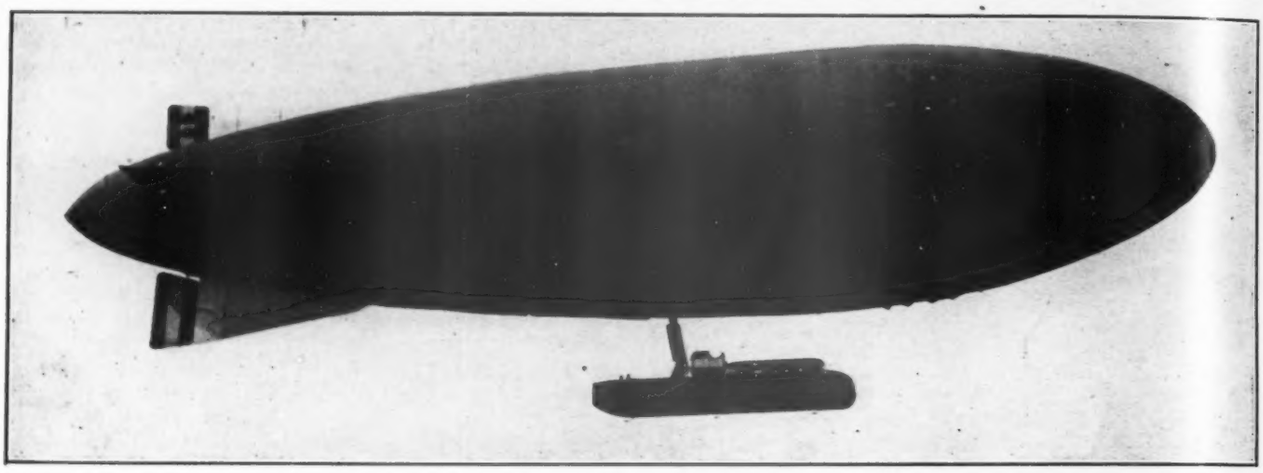
(F) The pilot's cockpit is located back of the mail compartment. There is 12 ft. length of engine mounting and strong fuselage ahead of him to break in case of a crash. There are no heavy objects back of him. It is probable the pilot will be not much hurt even in case of crash from tail spin.

Description of U. S. Army Airship RN1

Ship Manufactured by Airships Incorporated, of Hammondsport, N. Y. Is Largest American Non-rigid

The RN1 is a non-rigid type airship with a gas capacity of 340,000 cu. ft. It is 262 ft. long with a maximum beam of 48 ft. The overall height is 70 ft., and the length of the car 55 ft. The hull has two air ballonets of about 40,000 cu. ft. capacity each, giving the ship a ceiling of about 10,000 ft.

The ballonets are connected to a motor blower in the car through long fabric air leads or ducts on the bottom of the ship. These ducts have automatic non-return flap valves to prevent the air pressure backing out from the ballonet.



New U. S. Army airship RN1 in flight. The RN1 is not only the largest American non-rigid but embodies the most modern practice in airship construction

There is a manually operated damper valve in the duct which allows the distribution of air from the motor blower to one or the other of the ballonets. The ship is trimmed in this way, that is, by pumping air in the forward ballonet the ship is made nose heavy and conversely by pumping air in the rear ballonet it is made tail heavy. The trim is nicely taken care of by this method although it is supplementary only to the action of the elevating surfaces on the tail of the shp.

The Hull

The hull is of three-ply rubberized cotton fabric aluminum coated. The outer and the inner ply are straight while the middle ply is biased 45 deg., as a preventative for spreading of tears. The hull has twenty gores running from nose to tail, and each gore is cut up into 85 rectangular panels. All the seams are cemented together with a 1 in. lap and sewed with a double row of double lock stitches. The seams are double taped on the inside of the hull with 2⅜ in. tape over 1⅝ in. tape. Seams are taped on the outside of the hull with a 1¾ in. tape. The junctions of the panels along the longitudinal seams just below the equator line are further reinforced with 8 in. discs of two-ply fabric. The double taping on the inside of the hull insures almost perfect resistance to gas leakage.

The part of the hull which is underneath each of the ballonets is of a lighter weight three-ply fabric, since the permeability required is lower here due to the fact that there is air on both sides of the fabric, whereas there is gas on the inside of the hull itself. The seams of the hull underneath the ballonet are only single taped on the inside.

The nose and tail are developed in flat cone form. The nose is stiffened with T section nose battens 24 ft. long. There are twenty of these nose battens, one of each of the longitudinal seams of the hull. They are inserted in fabric pockets, which are closed at the nose end by lacing similar to shoe lacing. The ten batten pockets which are below the equator line are equipped with draining holes at the aft end to lead off water and moisture and prevent rotting of the battens. Nose batten pockets which are above the equator line drain off at the nose end through the lacing. The top and bottom member of the battens are very light members of spruce while the vertical web is of three-ply veneer, with lightening holes. The whole batten is wrapped with airplane tape and doped. Each one of these 24 ft. battens weigh approximately 4 lb. They serve to prevent cupping of the nose at high speed and to prevent deformation of the nose should the internal pressure of the bag fall below normal.

Rip Panels

The hull has on the topmost element, both forward and aft, a rip panel. The rip panels are a series of six elliptical openings in the bag. These openings are covered by a long ripping strip which is cemented and sewed to the balloon on the inside. A rip cord is fastened to one end of the rip panel and is lead down through the ship to the car. The ripping strip can be ripped off thereby uncovering the elliptical openings and allowing the rapid escape of gas. The rip panel is used only in emergency, that is, in case of a storm or in case of danger of losing the ship when on the ground.

There are four standard 18 in. automatic airship gas valves on the hull, two of these are at the maximum section just below the equator line on port and starboard side. The other two are aft near the control surfaces on either side of the lowest element. Each of these four valves is further equipped with hand operating and closing lines. The closing lines are used to slam shut the valves in case they stick open.

There are four 18 in. automatic air valves, two in the forward and two in the rear ballonet. These valves also have hand operating and closing lines.

There are four pressure manometer connections on the hull. These connections lead through pressure tubing to different points on the hull and in the ballonet and to the pilot's instrument board where the manometer gages indicate at all times the pressure on the bag and ballonets. This arrangement of manometers is very important since the airship operates at a comparatively low pressure, viz., about

30 mm. water pressure which is slightly over and inch. Although this pressure is less than an ounce per sq. in. above atmospheric it is sufficient to make the enormous hull almost as hard as a wall, and it is sufficient also to retain the shape of the bag at 60 m.p.h. speed.

There are other accessories on the hull such as observation windows for examining the interior of the ship to see whether or not the rip lines hang correctly and that the ballonets are functioning, manholes or openings for interior inspection and inflation and deflation openings.

Control Surfaces

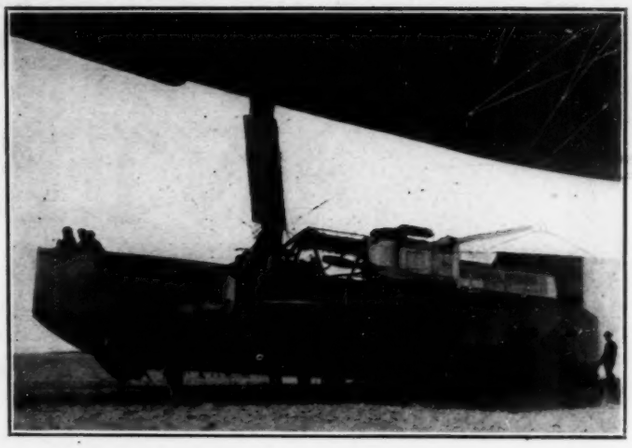
The tail group or control surfaces are attached to the hull near the tial. There are two horizontal stabilizers on port and starboard at the equator line. Each of these surfaces has an elevator or flipper. There is a bottom vertical stabilizer with a rudder or directional control surface and a top vertical stabilizer without a rudder. The frame work of these surfaces is constructed entirely of special duralumin tubing. They are covered with airplane cotton doped. The base of the surfaces is of wood and rests on a felt lined pad which is cemented to the hull. There is a system of anchor patches for strapping the surfaces to the hull. There is further a system of brace wires for bracing the surfaces to the hull. These brace wires are ⅛ in. steel aviator cable. One end is spliced to fittings on the surfaces and the other end is spliced into two finger suspension patches which are cemented to the envelope. There are further, drift wires for taking the drag of the control surfaces.

The car or nacelle is of rectangular section with a V bottom. The frame work is of duralumin and steel tubing with welded fittings, and wire bracing. The rectangular section contains space for the pilot and operating crew, the auxiliary motor and blower, bomb racks and ballast compartments. The V bottom holds a series of triangular shaped fuel tanks, drag ropes and parachutes. The two low compression Liberty motors together with their radiators, propellers and accessories are mounted on outriggers on either side of the car approximately amidships. The motors are controlled from the control station in the car. The forward half of the car is decked over for the convenience of the crew.

The nose end of the car was originally equipped with a 3 in. gun mount. There is also a Lewis gun mount on the tail end of the car.

Gun Cage on Hull

As an innovation in American airships the RN1 is equipped with a gun cage on the very top of the hull. This gun cage is reached from the car by a ladder and a gun shaft running perpendicularly up through the center of the envelope. This gun shaft is made of airship fabric with stiffening rings. Each ring has a ladder rung. The gun shaft flares out at the top into a gun cage. The gun cage is five feet in diameter and three feet deep. It is constructed of very light spruce members and rings. There is a Lewis gun mount fitted into the top of the cage where there is a revolving seat for a gunner, and a space for at least two observers. When not in use the gun cage is fitted with a fabric cover. The weight of the entire gun cage, gun mount and gun shaft is carried on a very large and very lightweight skid arrangement which distributes the load over a large area on the top of the hull.



Car of the RN1 with two Liberty engines. The ducts connecting motor blower in car with balloonets are an auxiliary means of trimming the ship fore and aft

The total weight of the RN1 which is of course equal to a gross lift of the gas, is approximately 22,000 lb. Of this weight about 7,000 lb. is in hull and attachments. The rest of it is in the car and useful load. The useful load includes crew, fuel, ballast and disposable load, such as parachutes, bombs and other military loads. This useful load consists of a crew of ten or twelve, together with fuel and ballast for 12 hr. at full speed. The top speed of the ship is 60 m.p.h. The cruising speed is about 40 m.p.h.

There is an elaborate arrangement of mooring and handling lines which permits the ship to be easily and successfully handled in all kinds of weather. This feature is one of great importance since the RN1 is the largest non-rigid ship in the country, being approximately 100,000 cu. ft. larger than the TC1 the next largest American nonrigid airship.

The ship will be stationed at Scott Field, Belleville, Ill. where it is now in process of erection.

The Navy's Schneider Cup Team which sailed for England Aug. 18 to compete in the seaplane race at Cowes, Sept. 28. L. to R. the pilots are Lieuts. F. W. Wead, in charge and alternate pilot, D. Rittenhouse, Rutledge Irvine, A. W. Gorton and Lieut. Charles W. Fox, paymaster

INTERNATIONA

ST. LOUIS FIELD, C

Don't Miss

$13,300 CASH PRIZES

$30,000 IN GOLD AND SILVER

TROPHIES

Including

Pulitzer Trophy

Liberty Engine Builders' Trophy

"On to St. Louis" Trophy

THIRD NATIONAL AERO CONGRESS

CONVENTION OF THE NATIONAL AERONAUTIC ASSOCIATION OF U. S. A.

AIR INSTITUTE OF THE AERONAUTICAL CHAMBER OF COMMERCE OF AMERICA

Beautiful Electric Lighted Floats

and Pageant of the Veiled Prophet

AL AIR RACES

D, October 1-2-3, 1923

n't Miss Them

AERONAUTICAL EXHIBITION OF SMALLEST, LARGEST, FASTEST AIRCRAFT IN THE WORLD

AERO ENGINES, PROPELLERS, ACCESSORIES

The fastest ARMY and NAVY and MAIL PLANES are entered in the races.

			Total Prizes
1.	September 20 to 30—"On to St. Louis" for St. Louis Chamber of Commerce Trophy	Civilians Only	$1,000
2.	Monday, Oct. 1—Two Seaters (90 H. P. or less) for Flying Club of St. Louis Trophy	Civilians Only	$1,000
3.	Monday, Oct. 1—Observation Planes for Liberty Engine Builders Trophy	Military Only	$1,500
4.	Tuesday, Oct. 2—Light Commercial Handicap (200 H. P. or less) for Aviation Country Club of Detroit Trophy	Civilians Only	$2,000
5.	Tuesday, Oct. 2—Large Capacity Planes for Merchants Exchange of St. Louis Trophy	Civilian and Military	$2,000
6.	Tuesday, Oct. 2—Model Race for Mulvihill Trophy	Members Junior Flying League, National Aeronautic Association	$ 300
7.	Wednesday, Oct. 3—Air Mail Planes for Detroit News Air Mail Trophy	U. S. Air Mail Pilots	$1,500
8.	Wednesday, Oct. 3—High Speed Planes for Pulitzer Trophy	Civilian and Military	$4,000

Endorsed by the late President Warren G. Harding and the Secretaries of the Army and the Navy and the Postmaster General. Sanctioned by the National Aeronautic Association of the U. S. A. under the rules and Regulations of the F. A. I. and the Aeronautical Chamber of Commerce.

For full information, description of trophies, entry blanks etc. address

FLYING CLUB OF ST. LOUIS

511 Locust St. **St. Louis, Mo.**

National Aeronautic Association Convention

Plans Completed for St. Louis Aero Congress. Sessions Will not Conflict with Races

The official program of the coming convention of the National Aeronautic Association, meeting in St. Louis coincident with the International Air Races, on Oct. 1, 2 and 3, has been announced by Howard E. Coffin, president of the Association. As was the case last year at Detroit, where the Association was formed to take the place of existing aeronautic bodies, including the Aero Club of America and the National Air Association, the business sessions of the convention will not conflict in time with the races, allowing the delegates and visitors to take in both events.

Registration of delegates, alternates and guests will begin on Sunday, Sept. 30, and will continue throughout that day at Convention Headquarters in the Hotel Statler. The Board of Governors of the association will also meet on Sunday at ten in the morning; and at eight that evening the preliminary organization meetings of the nine districts will be held, all meetings taking place at the Statler. Registration of delegates will continue each morning during the convention.

The Meetings

The first business session of the convention will take place on Monday morning at nine o'clock. Following the races there will be additional caucuses of the nine districts and the convention will again come to order after the annual banquet on Monday evening for a session that may last well into the morning. Election of officers for the ensuing year is slated for the Monday evening session.

A third session on Tuesday morning and a fourth on Wednesday morning are believed sufficient to transact other business and act on reports of the various committees. The evening of Tuesday, Oct. 2, will be given over to local entertainment, that being the date of the Veiled Prophet Parade and Annual Ball, a feature of St. Louis' hospitality remarkable for its unique costuming and mardi gras spirit.

Among those who have been invited as guests of the City of St. Louis, and of the convention, are four members of the Cabinet, Secretaries Weeks, Denby and Hoover and Postmaster-General New; also, General John J. Pershing, Samuel E. Winslow, Chairman of the House Committee on Interstate and Foreign Commerce, and Arthur Brisbane, the editor.

On Wednesday evening, following the Pulitzer Trophy Race, will be held the annual Aeronautic Smoker at which the trophies will be awarded to the winning pilots, from whom short speeches in response are expected. This smoker will also be utilized for the installation of the new officers and governors of the National Aeronautic Association and the new Board of Governors will have its first meeting following the smoker.

All Sessions at Statler

All meetings of the convention, caucuses and committees, as well as the banquet and the smoker, will be held at the Hotel Statler. Registration Headquarters will also be in that hotel. Reduced railroad rates of one-and-one-half fare for the round trip have been obtained from all passenger associations throughout the United States. This rate is on the certificate plan. That is, the individual purchases at his home town a regular one-way ticket, obtaining by request a certificate from the ticket-agent. In the event certificates are not available a receipt should be obtained. These certificates, or receipts, when validated at St. Louis, permit the holder to purchase a return ticket in St. Louis at one-half fare. The rate is given upon the provision that at least 250 certificates are presented at St. Louis and all persons attending the convention are urged to obtain such certificates, not only for their own sake but also that others, especially those coming from a great distance, may benefit by the reduced rate.

General arrangements for the convention are in charge of the Convention Committee of the St. Louis Air Board, of which Charles F. Hatfield is Chairman. The Reception and Entertainment Committee is headed by Col. Martin Collins, with Boyle Rodes as his vice-chairman, both these gentlemen being experienced in dispensing St. Louis hospitality. Arrangements for the details of the convention are in charge of the St. Louis Convention, Tourist and Publicity Bureau, which will equip and man the information booths, registration headquarters, etc.

Hotel Reservations

Hotel reservations may be made either direct with the St. Louis hotels or through the Entertainment Committee of the St. Louis Air Board, 511 Locust Street, St. Louis. A booklet giving advance information on all such matters, including hotel rates, has just been issued by the Air Board and will be sent free upon request. All persons, whether delegates or not, are urged to register at Convention Headquarters, to facilitate the delivery of mail, telegrams and enable friends to find one another. There is no registration charge. Tickets to the banquet and smoker, the races and trolley-cars leading to the field will be on sale at these headquarters, where full information will also be available.

The St. Louis committees have made three requests of the vistors to the convention. They are: First, Make your hotel reservation early; Second, Obtain reduced rate railroad certificate; third, Register at Convention Headquarters.

PROGRAM OF THIRD NATIONAL AERO CONGRESS

Hotel Statler, St. Louis, Mo.
Sept. 30, Oct. 1, 2, 3.

Sunday, Sept. 30:	
9 A. M.-6 P. M.	Registration of delegates, alternates, visitors, at Convention Headquarters, Hotel Statler.
10 A. M.	Annual meeting, Board of Governors, National Aeronautic Association.
8 P. M.	Caucus meetings of nine districts; rooms to be announced at headquarters.
Monday, Oct. 1:	
8-10 A. M.	Registration of delegates, alternates, visitors.
9 A. M.	First Business Session National Aeronautic Association convention.
5 P. M.	Caucus meetings of nine districts.
7 P. M.	Annual Banquet, Third National Aero Congress.
10 P. M.	Second Business Session, National Aeronautic Association convention. Election of officers and governors for ensuing year.
Tuesday, Oct. 2:	
8-10 A. M.	Registration of delegates, alternates, visitors.
8:30 A. M.	Third Business Session, National Aeronautic Association convention.
6 P. M.	Annual Parade, Veiled Prophet of St. Louis.
8 P. M.	Caucus meetings of nine districts.
10 P. M.	Annual Ball, Veiled Prophet of St. Louis.
Wednesday, Oct. 3:	
8-10 A. M.	Registration of delegates, visitors, alternates.
8:30 A. M.	Concluding Business Session, National Aeronautic Association convention.
8 P. M.	Annual Smoker, Third National Aero Congress; awarding of trophies; installation of new officers and governors of the National Aeronautic Association.
10 P. M.	Meeting of new Board of Governors of the National Aeronautic Association.
	Adjournment.

Franco-South American Airway Planned

A new line has been opened between Bordeaux, France, and Lisbon, Portugal, which is intended to be the first stage of the airway to South America.

Making Seaplanes in France

Airplane makers in France are turning their attention to the manufacture of hydro-airplanes for passenger carrying purposes. The "Chantiers Aero-Maritime de la Seine" has recently exhibited their type 33-t, capable of carrying a load of 1 ton, flying at the rate of 80 mi./hr., at an altitude of over 2,000 ft. with 1 idle motor.

Marcel Besson has made a successful flight in his new seaplane, said to be the largest in the world having a total wing spread of 225 sq. m. The machine is a quadruplane and is driven by 4 motors of 260 hp. each.

Barling Bomber Successfully Flight Tested

World's Largest Airplane Makes Impressive Flight of 28 Min. at Wilbur Wright Field

Surpassing the expectations of its designer and Air Service officials, the Barling bomber, the world's largest airplane, completed its maiden flight at Wilbur Wright Field on the evening of Aug. 22.

Because of its huge size and experimental design the first flight of the bomber had been looked forward to with exceptional interest, especially as there have been many rumors that it would not come up to expectations.

The ease with which the dreadnought of the air was maneuvered, both on the ground and in flight, and the 10 sec. take-off and slow landing speed were the chief features of the performance, seen by not less than 1,000 visitors. The plane was in the air 28 min.

Only one minor device was found to be in other than perfect order during the flight. This was the connecting rod between the upper and lower elevator planes on the tail, which vibrated considerably but in no way marred the success of the flight.

The tail of the Barling has a wing spread greater than that of the DH4, standard training ship of the Army Air Service, and this large tail, especially when the ship was far away, appeared quite similar to the box-kite tail of the first Wright ship.

As the bomber circled the field expressions of awe were heard on every side. It traveled about 25 miles. The highest altitude gained was 2500 ft., although pilots expressed the belief that a much greater altitude could have been obtained if desired.

The Landing

And then came the time for the landing, which most engineers believed would be the great test. The great plane majestically glided to earth, never wavering from the course set. Its landing speed was about 60 mi./hr., whereas the craft attained a maximum speed of 93 mi./hr. while in flight. The landing was perfect with no rebound whatever.

As the crowd swarmed to the field they were driven back by soldiers, and under its own power the plane maneuvered up the field until it was ready to be moored in the same place where it had rested for many weeks while final adjustments were made here preparatory to this flight. But this time the crowd could not be kept back and it surged forward to the plane.

Walter Henry Barling, designer of the huge craft, was one of the crew of four men who manned the ship. Lieuts. Harold R. Harris and M. S. Fairchild of McCook Field piloted the bomber. Douglas Culver, McCook Field mechanic, was in charge of the engines.

Harris was the first to come out, then Fairchild, followed by Barling and Culver. They all wore broad smiles.

The first question on everybody's lips was, "How did she go?"

Harris answered:

"I never handled a big ship that answered more readily to the controls than the Barling. It was simply fine in every detail but one. That one was the connecting rod between the upper and lower elevator planes. There seemed to be a lot of vibration there."

Crew of the Barling Bomber. L to R.: Walter H. Barling, designer, Douglas Culver, mechanic, Lieuts. Harold R. Harris and Muir S. Fairchild, pilots

A complete description of the Barling Bomber with six photographs, appeared in the July 9 issue of AVIATION.

DIMENSIONS, WEIGHTS AND PERFORMANCE

Official designation, NBL1
Type, 2½ planer
Wing spread, 120 ft.
Height, 28 ft.
Overall length, 65 ft.
Gasoline capacity, 6 tons (2,000 gal.)
Oil capacity, 1356 lb. (181 gal.)
Engines, 6 Liberties
Minimum crew, 4
Weight loaded, 40,000 lb.
Speed, 90 mi./hr.
Bomb load, 5,000 to 10,000 lb.

Defects in Airplane Woods

All wood is subject to defects, of which the most serious is decay. Decay in its incipient stage is not readily recognized, but the first indication is usually a discoloration of the infected wood. Studies to determine the defects of wood by means of the various discolorations were made by the United States Department of Agriculture and the results published in a bulletin just issued.

The new bulletin, No. 1128, Decays and Discolorations in Airplane Woods, is illustrated with eight delicately colored plates showing the numerous colorings in such minute detail as to assist the practical man in judging the strength of timber.

A copy of the bulletin may be secured from the Department as long as the supply lasts.

International Air Races and the Designer

Executive Vice-Chairman, Contest Committee, N.A.A.

By B. RUSSEL SHAW

Airplane designers are able to obtain much valuable technical information from races such as will take place in St. Louis on Oct. 1-3, and which can be secured in no other manner. Tests are constantly being run to determine various problems in design; but in no way can faulty construction and weak materials be so forcibly brought out as in a race wherein the pilot sets his teeth and pulls open the throttle with the determination of getting everything possible out of his ship.

On to St. Louis and Light Plane Races

The "On-to-St. Louis" race has been put in the program of events particularly in order to encourage civilians to fly to the races. Cash prizes totaling $1000.00 and a trophy donated by the St. Louis Chamber of Commerce have been offered to the winners of this event. True, there is a certain element of efficiency entering into the final determining of the winners, inasmuch as it is a race on points, in which the pilot is credited for his average speed, passengers carried, distance covered, but penalized on horsepower.

This race will hardly bring forward any new designs and as far as the airplane designer is concerned, the only thing which he may possibly learn is some additional data upon the touring adaptation of the light planes which will probably be entered in this cross country flight.

The Flying Club of St. Louis donated a trophy and the St. Louis Organization has put up prizes totaling $1000.00 for a race for light two-seater airplanes. The horsepower has been restricted to 90 as a maxium. Here the engineer will probably be able to secure a certain amount of engineering data with particular reference to the streamlining of existing types, and otherwise cutting down the head resistance to a minimum. It will be interesting to note the difference in performance due to refinements in design, if three airplanes of the same type are entered in this race—one with the conventional nose radiator, the second with a stream-line nose and side radiators, and if possible, a third with skin radiators. Considerable variations in speed would naturally be expected with a given horsepower and design.

Liberty Engine Builders' Trophy

The Liberty Engine Builders' Trophy will again be competed for by observation type two seater airplanes. The planes entering this race must carry a "Contest Load" during the race, which load will be determined from the following formula using as a basis the cubic inch displacement for the 400 hp. Liberty engine as follows:

$$\frac{400}{1649.34} \times \text{cubic inch displacement of motor used} \times 0.85 = \text{"contest load"}$$

The regulation calling for carrying this load was adopted in order to more or less equalize the various entries; particularly in view of the wide variation between what is known as observation type airplanes in the Army Air Service and those of the Navy Bureau of Aeronautics. It would be even more interesting from a commercial standpoint if the loads carried were in the same form as the military loads are distributed during military maneuvers. For instance, some of the planes which will probably be entered have been designed to carry a great portion of their load in the inclosed fuselage bomb racks; others having been designed to carry this armament on wing racks or in the form of a single large bomb suspended under the fuselage. In addition to the trophy referred to, cash prizes totaling $1500.00 have been offered.

Aviation Country Club Trophy

One of the most interesting events from the standpoint of the designer will be the light commercial handicap race for the Aviation Country Club of Detroit Trophy and cash prizes totaling $2000.00. This race will be for light commercial airplanes of 200 hp. or less, designed comfortably to seat two or more passengers. For the benefit of the public the race has been separated into two parts; that is, prizes will be offered for planes finishing in first, second, and third place for speed alone, while other prizes will be given to the planes competing the full course with the highest figure of merit based on the following formula:

$$\frac{W}{HP} \times \text{Mi./Hr.} = \text{Figure of Merit.}$$

W—Weight of load passengers

HP—Horsepower credited to contestant.

It will be noted that the contestant is given credit for what is commonly called "Ton miles per hour" and is penalized for the horsepower of his engine. We would naturally be more interested if the contestant were penalized on gasoline consumed and given credit for the exact weight carried of being allowed 170 lb. for each passenger. However, in drawing up the regulations it was felt that safety was the first factor; therefore, the pilot will only be allowed to load in as many times 170 lb. as there are comfortable seating accommodations for passengers. Also, the horsepower was accepted in lieu of gasoline consumed due to the difficulty in weighing the gasoline on the field during the excitement prevailing in a race of this magnitude.

Engineers will find this race particularly interesting in view of the probable entry of certain cabin planes, which have been credited with a high figure of efficiency.

St. Louis Merchants' and Mail Races

The race for large capacity airplanes, for which the Merchants Exchange of St. Louis has donated a trophy in addition to the $2000.00 prize money, will probably for the first time, bring together in an event of this character large capacity planes of the single and twin engine type. Designers claiming one or the other of these types as the most efficient, will watch with interest the results of their pet theories. The maneuverability of the planes, particularly in rounding the pylons, will be closely observed. Many interesting facts will, no doubt, be learned. If the turns in this event were around single pylons instead of double ones so that the planes would be forced to bank to a greater angle, the question of maneuverability would be much more emphasized. It was in order to have these large planes flying "light" that the loading was again based on a formula similar to that employed in determining the load for the observation type airplanes except that in this case there is a slight change in the load per horsepower as follows:

$$\frac{400}{1649.34} \times \text{cubic inch displacement of engine or engines used} \times 2 = \text{"Contest Load"}$$

The model race for the Mulvihill Model Trophy will be interesting and instructive to the boys, although it is hardly predicted that any unusual models will be entered.

A race has been set aside for U. S. Air Mail Pilots, flying air mail planes, for whom the Detroit News Air Mail Trophy will be up for competition together with cash prizes of $1500.00 It is predicted that the latest planes developed by the Air Mail Service as a result of their widely varying experience in carrying mail from coast to coast, will be entered in this event. Engineers and commercial airplane operators would do well to investigate the constructional details of these machines for they only embody such changes as have been prompted by actual service conditions.

Pulitzer Trophy Race

The Premier event of the St. Louis meet will, of course, be the Pulitzer Race for high speed planes. Last year the laurals went to the supporters of the thin winged biplane. All en-

gineers are asking the question whether thin winged biplanes with external supports and the resulting parasite resistance are superior to thick internally trussed aerofoils. Obviously, the planes with skin radiators will have the advantage. Whether this would be an advantage under war conditions is another question. The vulnerability of a plane so equipped is naturally increased. Retractable landing chassis will, no doubt, again be in evidence and it would be interesting if two planes identical in other respects, but one with a retractable landing gear and the other of standard construction, could be placed in the race.

It would be also interesting if some ambitious designer would build a plane with skids and a pilot could manage to take off with them, then note the increase in speed and the short run of such a plane after landing. Lateral control at 200 mi./hr. is a serious problem, particularly if the planes designed are such as to encourage periodic vibrations in the wing spars and fluttering in the ailerons.

It is from designs of planes such as those finishing this race, that engineers will be able to bring out new pursuit planes of a superior type. From present indications the number of entries for the events will exceed that of any other year.

New Type of Rigid Airship

By H. K. IHRIG, M. E.

The use of airships for commercial purposes has undoubtedly been delayed by some recent disasters due to fire which have cost large tolls in human life. There are however several qualifications which make the airship desirable for passenger transportation, most notably its great weight carrying capacity and its ability to remain in the air without motive power.

The use of helium instead of hydrogen offers the best solution to the fire problem but introduces new problems of its own, due to the scarcity and consequently high cost.

The construction shown in the accompanying sketch suggests a means of overcoming these problems to an appreciable extent. This consists of another envelope contained within the usual main envelope the size of the inner being, as an example, half the volume of the airship as a whole. Both the inner and outer bags are divided into smaller ballonets similar to the usual construction. However, owing to the additional longitudinal division provided by the inner bag, the transverse divisions need not be so frequent as heretofor and thus practically no increase in weight results.

The inner bags are filled with hydrogen and the outer with helium, thus providing a thick wall of insulation around the inflammable hydrogen, giving a construction highly resistant to fire and probably just as effective as if all helium were used. The available supply of helium would thus be made to extend twice as far as otherwise. It is worthy of note that the lifting capacity of the airship is increased to an appreciable extent as compared with construction where all helium is used.

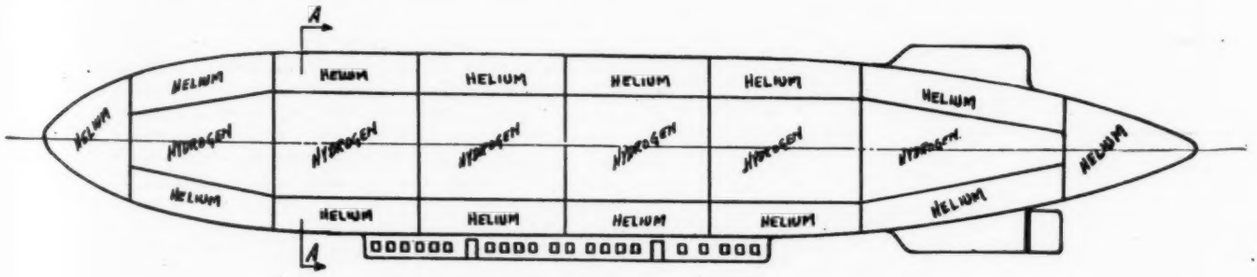
As a means of comparison assume three airships all built to the same plans as the ZR3 (now being built in Gemany for the U. S. Navy) except that No. 1 is filled with hydrogen, No. 2 with helium and No. 3 made according to the proposed design.

	No. 1	*No. 2*	*No. 3*
Volume in cu. ft.	hy. 2,400,000	he. 2,400,000	he. 1,200,000 hy. 1,200,000
Lift in tons	90	81	85½
Cost of gas filling	$24,000	$312,000	$168,000

The above costs are based on the best available data giving 1 cent per cubic foot for hydrogen and 13 cents per cubic foot for helium.

The proposed construction offers an explosion proof airship at a saving of $144,000.00 under the cost of No. 2. It has 4½ tons more lift than No. 2 or sufficient to carry additional fuel for 9 hr. longer flight with the five 400 hp. engines running wide open.

The proposed construction should also be of value for military purposes as well as commercial.



LONGITUDINAL CROSS SECTION THRU PROPOSED AIRSHIP.

SECTION AA

Proposed type of rigid airship, with external helium chambers and internal hydrogen chambers

Chicago's Model Airplane Meet

Carl Rosmanith, 3721 Greenview ave., a member of the Illinois Model Aero Club, won first prize in the *Daily News'* original design model contest and walked off with a beautiful loving cup and cash award of $75.00 at the model airplane meet, held at Chicago, Aug. 18. J. M. Schutte, residing at the Plaza Hotel, who exhibited three planes, won second and fourth prize, amounting to $50 and $25 respectively. Almer Woolley, 6917 S. Union ave., won the third prize of $40 as well as fifth and sixth, honorable mention.

Rosmanith exhibited a small single seat monoplane, designed for sport or messenger service. He was not only awarded many points on the excellent workmanship embodied in the ship, but also on the flying qualities, which were beyond reproach. When the little plane took off from the floor of the big auditorium at the Municipal Pier, rising in the air as smoothly and steadily as a big DeHaviland, cheers and applause filled the hall. The plane circled high around the room, then descended smoothly and made a perfect three point landing. It is largely the beautiful take-offs and landings that won Rosmanith the most points. The longest flight made by his ship was 13 4/5 sec.

J. M. Schutte, winner of the second and fourth prize, had a ship on display embodying a feature whereby the angle of incidence may be changed from the pilot's seat. This model was not intended to fly and was therefore made more solid, heavy and complete in all details. Its wings were of natural color, the fuselage grey and the engine cowlings black enamel, a very pleasing combination. Both Schutte, who also entered two flying models, and Almer Woolley, who won the other prizes in the original design contest, had some difficulty in making their ships fly, thus losing out on this point.

Bertram Pond, 1121 N. LaSalle street, and R. Miller, both members of the Illinois Model Aero Club, amused the many spectators by staging a duration contest of their own. Pond flew a tiny ship, weighing only six one hundredth of an ounce. It climbed in a small circle to the ceiling of the auditorium, remained there for a long time and circled down again, remaining in the air first 52 sec. and later 61⅕ sec. This little ship, nothing more than a "flying stick", walked off with all honors at Grant Park the same afternoon, remaining in the air 3 min. 15 sec., and landing far out in the harbor. Miller's plane was constructed on the same principle, but much larger, and although it held the attention of the crowd while it climbed in big circles to the rafters of the building, it did not carry enough "gas" to beat its diminutive competitor.

Bertram Pond, in making the flight of over 3 min. at Grant Park, won the big silver cup, donated by J. F. Cornelius. He also won an airplane flight with the Heath Airplane company by winning the scale model contest with a model of a German all-metal Junker plane. The little model, not containing as much metal as its big German relative, had to be weighed down with quarters and dimes before it would perform.

The South Parks, who originally started the movement to interest the growing generation in aeronautics, had a number of entries in the duration contest. The boys are all in the neighborhood of 12 years old and have never built planes before the South Park Board provided instructors for them at several of its playgrounds a few weeks ago. The models naturally were of the simplest kind, representing the first stages in model building. However, some nice work was turned out and many good flights made.

William Luberski, 238 West 31st street, won the Class B event, which entitles him to a long flight in Dr. R. R. Ferguson's plane. Peter Skverecky, a member of the McKinley Park class and Charles Wolthius, both south side boys, won several flights in Buck Weaver's plane. Vernon Hoeger will join the crowd, thanks to the exceptional performance of his little plane.

The speed test for the Sheldon Clark cup and the power model contest for the cup offered by Florence Macbeth and a typewriter by the Shipman Ward company, was postponed until Aug. 25. It is understood that there is only one model entered having a real power plant, all others having the conventional rubber band engine.

St. Louis Meet Activities

The Flying Club of St. Louis has made arrangements to have all pilots on the St. Louis Field take the qualifying tests, if they have not already done so, and they will then be classified according to their flying ability. Those who satisfactorily pass the tests will be permitted to take up passengers at all times. Others will be permitted to fly but not to carry passengers, while the least satisfactory will not be permitted to fly without a qualified pilot accompanying him.

Reduced railroad rates on the Certificate Plan for those attending the Aero Convention, have now been obtained from the New England, Central, Southwestern, Transcontinental, Trunk Line, Southeastern, Western passenger associations.

These associations cover the entire United States, so that all points are now included in these rates. Tickets may be purchased beginning Sept. 26, except from points near at hand, and are good for return to Oct. 6. The visitor purchases one-way ticket at regular rate, and obtains from ticket agent a certificate. This, when validated at convention headquarters in St. Louis, allows the purchase of a return ticket at one-half fare.

The Convention will be held in the grand ballroom of the Hotel Statler, Monday evening, Oct. 1, where the banquet and smoker will also be held. Committee and caucus rooms adjacent will be available, and registration headquarters will probably be in the small ballroom leading into the grand ballroom.

Tickets for the Annual Aeronautic Banquet as well as the Annual Smoker, will be placed on sale at Convention Headquarters. It is the policy to distribute these in order of request, and, it is pointed out, since it is particularly desired that all members of the Air Board and the Aeronautic Corporation be present, all are urged to place their request for places at the earliest possible date. An attendance of 600 is being arranged for.

Construction of the 19,000 boxes at the St. Louis field has been started. The status of other work at the field follows:

The first pylon, 65 ft. high, has been completed; two miles of fencing has been erected; the first 10,000 gal. gasoline tank is on the grounds ready to be put in position; hangars 1 and 2 have been finished, while hangars 3 and 4 are now being erected; two direct telephone lines have been installed.

Promise of fine sod on the field by the time of the races is seen in the appearance, two or three inches above the surface, of the Italian rye recently sown.

An aerial advance agent for the St. Louis events will be constantly on the wing until the time of the meet. The first flight was from St. Louis to Davenport, Ia. The plane was piloted by W. B. Robertson, with Roy S. Rauschkolb of the St. Louis Chamber of Commerce as passenger. During his stay at Davenport Mr. Rauschkolb adddressed a large gathering of people at the Mississippi Valley Fair and Exposition.

Russel B. Shaw reports work well under way on the many technical details of the Races. Work has begun on the field pylon and drawings completed and handed over to the Grounds Committee for building the timers' stand and press box. Wheel checks have been ordered, as well as motor stands.

Timers' Sheets and Judges' Score Cards have been printed, as well as final instructions for these men.

Arrangements are under way to secure field glasses for the Judges, to be issued on loan slips. Two sources of supply have been located but arrangements have not been closed.

Inquiries regarding entries have been received from widely separated localities, and final notice has been sent out to all prospective entries, calling attention to the closing date for free entries on Sept. 1. A rush of entries is expected in the next two weeks.

The National Aeronautic Association reports that the Pulitzer and Liberty Engine Builders' trophies are being created and insured for shipment to St. Louis at an early date for window display purposes.

Arrangements have been completed to bring to St. Louis early in September the 1,200,000,000 candle-power searchlight of the Sperry Gyroscope Co., which is said to have a range of 100 miles. It will be set up on a high elevation near the city.

U. S. ARMY AND NAVY AIR FORCES

U. S. ARMY AIR SERVICE

Flight Test of Instruments

Lt. A. F. Hegenberger, pilot, and Mr. Bradley Jones, observer, returned recently from a nine-day air trip from Mc Cook Field, Dayton, Ohio to San Francisco, via Minneapolis, in connection with the testing of the "Pioneer" ground speed and drift meter over rough country, the comparing of the efficiency of the Bunge air sextant with that of the Engineering Division air sextant, and the practising of the reduction of observations by the pre-computation method.

Satisfactory results were obtained with the ground speed and drift meter as far west as Cheyenne. Over the mountainous country however, results were inconsistent and unsatisfactory, because of the difficulty of determining the actual height of the airplane above the object sighted.

The Engineering Division sextant performed better than any sextant tested thus far. The motion of the level or artificial horizon, which consists of a gyro-controlled ball-in-hand inclinometer, due to accelerations, was much less and through a smaller range than that of the usual type of artificial horizon. As a result, observations were made more easily and quickly than formerly, and more consistent results were obtained. By means of a spirit level the sextant is held horizontal and the angular elevation of the sun can be read on a scale on the side of the instrument.

The flyers came through some very severe storms over the Wasach mountains, and Mr. Jones' face suffered some damage from frost.

Radio Apparatus Aids in Winning Balloon Race

In the official report covering his victorious free balloon flight as a contest in the National Balloon Race, Lieut. Robert S. Olmstead, Army Air Service, attributes his success in a measure to the valuable and efficient service rendered by the radio apparatus with which his balloon was equipped. The instrument, a Radiola II, was loaned to the Army Air Service by the General Electric Company. A standard airplane antenna o fabout 300 ft. of copper wire was used and 25 ft. of three-foot copper screening served as a ground. Lieutenant Olmstead's report read as follows:

"The radio installation complete with antennae and counterpoise weighed around thirty lbs.. In weight therefore it represented roughly one bag of sand ballast. Both Lieut. Shoptaw and myself agreed many times, upon receiving a particularly enlightening bit of information, that it was worth several times over its weight in sand. It should always be remembered furthermore that the set could be used as ballast quite efficiently by the simple process of dissembly, therefore, I do not believe that any parasite weight whatever should be charged against it.

Immediately upon taking off we dropped our antennae and (copper screen) ground and wired up to receive. The results were uniformly good from the first. Musical program after musical program with great clearness came in, and incidentally the Demsey-Gibbons fight returns came in from Detroit by rounds, we were as intent on the fight as on the Race. There seemed always to be music in the air, and to anyone who has experienced the monotony, when everything is going well, of the hours of darkness in a balloon race flight, the value of such restful relief therefrom is very evident. It materially added to our efficiency through assuring rested nerves; at times when good judgement was required in forming decisions as to what course to pursue as problem after problem arose; at times the audibility of the set was sufficient to allow of leaving the head-set hanging in the rigging. There should, however, always be two head-sets provided to a basket, — we had but one. They do not interfere in the least with the work of the pilots, and the tendency is to wear them at all times. So much for the amusement phase of the radio in a Balloon Race.

Now for the more primely important feature of having such an instrument along. From Detroit, Chicago and Schenectady, particularly from the latter city, we received quite definitely the weather reports consisting of general flying conditions, wind directions and velocities, cloud conditions, and of great importance the pressures recorded at various important cities. This information was quite conclusive in influencing our tactics to obtain a suitable direction of flight in order to obtain maximum endurance and distance. A feature of which should be added and which we keenly felt the need of for several hours while out of sight of any land marks or other means of locating our position or rate and direction of progress over Lake Erie (we were over Lake Erie from 8:15 a. m. to 5:50 p. m. July 5) is a direction finding attachment. A loop hung above the Load Ring with compass attached thereto it is believed would solve this problem.

A point of vital importance in a race, and which had considerable bearing on our decision to land at the time we did, was the advice received by Radio of the location of our various competitors from time to time. At the time of landing we knew that all but three of our competitors had been accounted for, and we were quite certain through deductions from the information previously received of the progress of the others that we were at least in one of the three winning positions and eligible for the team to go to Belgium. Had we not had this information, we might have tried to cross Lake Ontario without sufficient ballast, and if failing in the attempt, would have disqualified ourselves.

My recommendations are that:

(a) Most emphatically a Radio set should be installed in every Racing Balloon.
(b) Directional attachment should be added.
(c) Two head-sets should always be provided.

Successful Refresher Course

The 18 R. O. T. C. students of the Texas A. & M. College and the 27 Reserve Officers in the vicinity of San Antonio, Texas, all of whom were flying daily, gave Brooks Field the appearance it has during the regular period of flying training. This rush was relieved, however, by the departure of the 18 R. O. T. C. men for their homes. Our Brooks Field Correspondent states that "Major Russell is to be congratulated on the splendid type of young men he has taken in his Air Service unit at the Texas A. & M. College. All of the young men seemed to enjoy the camp here very much and would have been glad to spend more of the summer here."

The 23 Reserve Officers also completed their allotted period of time and departed for their homes. Nearly all of them were soloing again in fine shape before they left, and several were flying DH's, SE's and Spads. Major Edgar Tobin was the ranking reserve officer attending the camp, and he found little trouble in getting back his flying touch which made him so unpopular with the Hun during the World War. Everything possible was done to make the Reserve Officers enjoy their stay at Brooks Field, and they showed their appreciation of the efforts of the Regular Officers by presenting the Officers' Club with a very beautiful clock, which now occupies a place of honor on the mantel above the fireplace. The clock fulfills a long felt want in the Officers' Club, and the officers are very grateful for this gift from the Reserve Officers.

Reserve Officers Training Camp on Border

The Training Camp for Air Service Reserve officers opened at Fort Bliss, El Paso, Texas, on July 15, a total of fifteen reserve officers being in attendance. These officers were given dual flying instruction, also instruction in aerial gunnery, artillery adjustment, and other subjects. Lectures were given daily on all subjects pertaining to Air Service.

Flying Time of Crissy Field Pilots

A Crissy Field Correspondent calls attention to the fact that for the fiscal year ending June 30, 1923, the pilots stationed at that field have rolled up a total of something like 3120 hr., and goes on to say:

"Now we have no desire to run in any statistics or comparisons on unsuspecting readers, so we won't go into the matter of how far the above number of hours would reach if placed end to end or side by side, or however one arranges hours to make the best showing. We would like to point out, however, that about 2500 hr. of this time were accumulated in cross-country flights — and cross-country flying around these parts means the traversing of considerable topography, to say nothing of large rough chunks of landscape.

About 575 hr. of cross-country were put in by the Forest Patrol Detachment operating in Oregon last Fall; 1350 hr. are chargeable to miscellaneous cross-country, as, for instance, ferrying ships to and from San Diego, photographic missions along the coast anywhere from Canada to Mexico, and various errands to all parts of the Corps Area.

Over 500 hr. were spent on the Marshall-Webber hunt during Dec. On the face of it, this latter item does not loom up as any record-breaking achievement. In the light of the many records that have been established or broken recently, this mission has no particularly interesting news value. All that took place might be summed up as follows: 'Sixteen planes left Crissy Field about the middle of Dec., proceeded to points along the Mexican Border, made daily searching patrols, and at the end of about ten days returned to Crissy Field'. That's all there was to it; nothing startling maybe, but nevertheless worth looking into from a standpoint of what might be called every day aeronautical operations.

The point is this — that immediately upon receipt of orders and without any opportunity for unusual preparations, sixteen planes, carrying thirty-two pilots and observers, left this Field for the Mexican Border, over 500 miles away . The orders were not anticipated; the planes were the regular squadron planes in every-day use — all we had, in fact; the pilots were not hand--picked — just every one available; the weather in this entire region was bad, so bad, in fact, as to be prohibitive to any ordinary flying and making it necessary for every plane to fight its way through clouds and rain for a large portion of the southward trip. The daily patrols in the region between San Diego and Tucson, Arizona, were then carried out over territory entirely strange to most of the Crissy pilots, and including some of the worst geography in the entire collection of Messrs. Rand McNally. Even one forced landing would have diverted the operations of a number of other ships and might possibly have required the attention of the entire expedition. There were no forced landings and no delays of any sort due to mechanical trouble. The service was 100 per cent.

In other and more condensed words, the Ninety-First Squadron went away, did its stuff, and returned on schedule and, although that may not be any world-beating record, it's shooting par anyway."

Field Named to Honor Officer

The flying field at Aberdeen Proving Ground, Md., has been named "Phillips Field" after First Lieut. Wendell K. Phillips, A.S., killed in an airplane accident on June 5 at that station.

To Inspect Surplus Airplane Material

Capt. Carl W. Connell, A.S., now on duty at the Aeromarine Plane and Motor Company, Keyport, N. J., is appointed special inspecting officer to inspect and dispose of certain Air Service material at the plants of the Aeromarine Plane and Motor Company, Keyport, N. J.; Wittemann Aircraft Corporation, Hasbrouck Heights, N. J.; Thomas Morse Aircraft Corporation, Ithaca, N. Y., Gallaudet Aircraft Corporation, East Greenwich, R. I.; Lawrence Sperry Aircraft Corporation, Farmingdale, L. I.; and Cox-Klemin Aircraft Corporation, College Point, L. I., such material having been left over from airplanes furnished these contractors for remodeling.

Cross Country Flying in the Philippines

Cross-country flying in the Philippines is always replete with interest on account of the rugged and picturesque scenery, but it has its drawbacks at times, especially during the rainy season, for the roads are few and mud is everywhere, and luckless pilots who experience forced landings are, to use the Army expression, "outa luck".

Recently Captain Gilbert T. Collar and 1st Lieut. Charles R. Evans, stationed at Clark Field, caused much uneasiness and anxiety to the personnel at that field for several days. They were reported to have left Camp Nichols, Rizal, in a DH4B airplane, at 2:25 p. m., bound for Clark Field, an aerial journey of about an hour and a half. At 4:00 p. m. they had not arrived at Clark Field, and a radio message to Camp Nichols brought forth the response that they had not returned to that station. A low ceiling with rolling clouds and frequent showers made low flying necessary. At 4:25 p. m., however, three planes, led by Captain A. H. Gilkeson, took off in search of the missing plane. After two hours of flying no trace of the plane was discovered, and the flight returned to Clark Field. Messages were sent to different Provincial Constabulary commanders to be on the alert for any plane that might fly over or land near the command. A car was sent out at night from Camp Stotsenburg to make inquiry throughout the northern provinces. The following morning brought forth no report on the missing airmen, and planes were sent out in pairs to make a systematic search of Luzon. Luzon Island was divided into numerous sectors, two officers being assigned to a sector, with a relief schedule every two hours. The search continued until 9:30 a. m. the following morning, when the two much sought officers reported to Headquarters via a Calesa, none the worse for their experience, except that they were wet, hungry and in need of sleep.

Briefly, they were forced down some 25 miles Northeast of Clark Field and made a landing in a rice paddy without injury to person or plane. Arrangements were made for the recovery of the plane and due to lack of roads suitable for motor transportation, the plane will have to be floated down a stream to Arayat City and thence by truck to the airdrome. After leaving a native in charge of the plane, the two officers walked through the flooded rice fields during most of the night before any transportation could be secured to take them home.

Army Orders

Leave of absence of two months to Capt. Idwal H. Edwards, A.S.

Sec. Lieut. Homer W. Ferguson, from 1st Field Artillery, Fort Sill, Okla., to Air Service, Brooks Field, Tex.

First Lieut. Donald G. Duke, A.S., from Air Office Headquarters, Eighth Corps Area, Fort Sam Houston, Tex., to Office C.A.S., Washington, D. C.

First Lieut. William H. Carthy, A.S., from Scott Field, Ill. to Fairfield Air Intermediate Depot, Fairfield, Ohio.

Capt. Ralph H. Wooten, A.S., and First Lieuts. Isaiah Davies, James L. Grisham, Charles B. Austin, Paul E. Burrows, A.S., Langley Field, to A.S. Tactical School, that station.

First Lieut. Samuel G. Frierson, A.S., from Selfridge Field, Mt. Clemens, Mich. to Fairfield Air Intermediate Depot, Fairfield, Ohio.

Leave of absence of one month and ten days to Sec. Lieut. Edward A. Hillery, A.S.

Capt. William B. Mayer and First Lieut. Harold R. Wells, A.S., from Scott Field, Ill. to Engineering School, McCook Field, Dayton, Ohio, for instruction.

First Lieut. Edward L. Fernsten, A.S., from Scott Field, Ill. and temporary duty at Kelly Field, Tex., to Air Service, Panama Canal Department, Panama.

First Lieut. Oliver P. Gothlin, jr., from Fairfield Air Intermediate Depot, Fairfield, Ohio, and First Lieut. John A. Wyatt, Kelly Field, Tex., to Air Service, Hawaiian Department, Honolulu.

Capt. William E. Lynd, A.S., from Kelly Field, Tex., to A.S. Tactical School, Langley Field, Hampton, Va., for instruction.

Leave of absence of one month to Sec. Lieut. Lyman P. Whitten, A.S.

U. S. NAVAL AVIATION

Navy Balloonists Leave for Brussels

On Thursday, Aug. 24, the balloons and equipment to be used by the Navy entries in the Gordon Bennett International Balloon Race left New York on the S. S. Innoko, bound for Brussels. The two Navy pilots, Lieuts. J. B. Lawrence and F. W. Reicholderfer, together with two enlisted men as handling crew will follow on Sept. 1 The Race is to be held at Brussels, Belgium, on Sept. 23. Entries from many nations will participate. This is a classic contest that has attracted balloonists for many years.

Ground Stunting at Pensacola

The aviators in training at the Naval Air Station, Pensacola, Florida have gone Walter Camp's "Daily Dozen" one better. Each morning the embryo pilots line up and go through exercises that resemble the movements of a plane. They simulate "barrel rolls", "nose dives", "loops" and other aeronautical contortions. The purpose of these exercises is to accustom the students to the unusual positions and movements incidental to flying.

Marine Aviators Killed in Collision

Capt. George F. Hill, Marine Corps, of Leominster, Mass., and Second Lieut. Cornelius McFadden, Marine Corps, a native of Philadelphia, were killed in an airplane crash at Marine Barracks, Pensacola, Fla., on Aug. 22, as the result of a collision in the air between the VE7 plane in which they were flying and another VE7 piloted by First Lieut. Morton A. Richal of the Marine Corps., who survived with minor injuries. At the time the planes were engaged in combat formation at an altitude of approximately 3,500 ft.

Navy Mechanics Win Races

The men of the Aviation Mechanics School at the Great Lakes Training Station near Chicago won two boat races from crews from Culver Military Academy this month. The boats used were standard navy cutters, light and heavy.

The Navy heavy cutter did one nautical mile in seven minutes and forty three seconds, only two seconds under the world's record for cutter races at this distance. The light cutter won from Culver by one and one half boat lengths. This is said to be the first time in nineteen years that Culver has lost a light cutter race.

Personnel Notes

Captain G. W. Steele, U.S.N. called at the Bureau of Aeronautics this week to discuss with Admiral Moffett and the officers of the Bureau the plans in connection with the ZR-3. Captain Steele is to command this airship upon her arrival in this country from Germany, where she is now being built for the United States. He will be aboard her in the capacity of an observer on her flight across the Atlantic in November.

When Captain Robert J. Archibald, U. S. M. C., was detached from Marine Observation Squadron Two at Port au Prince, Haiti, and ordered to Washington, a dance was given in his and Mrs. Archibald's honor. The affair was given by the combined efforts of the officers of his own organization and those at Santo Domingo.

Orders to Officers

Lieut. Russell V. Pollard, detached Naval Air Station Pensacola to Aircraft Sqadrons Scouting Fleet.

Lieut. Hugh S. Sease, detached Naval Air Station Pensacola, to Aircraft Squadrons Scouting Fleet.

Lieut. Robert L. Fuller, orders 7-11-23 revoked continue duty Aircraft Squadrons Battle Fleet.

Lieut. (jg) Charles A. Collins, detached Receiving Ship Philadelphia to Naval Air Station, Anacostia.

Lieut. Carleton McGauley, detached Aircraft Squadrons Scouting Fleet to Naval Air Station, Pensacola.

Mach. Stephen D. Thornton, detached Naval Air Station Hampton Roads to U.S.S. Wright.

Ch. Mach. Rufus H. Bush, detached Bureau of Aeronautics to Naval Air Station, Hampton Roads.

From Panama to Hampton Roads

The commander, Aircraft Squadrons, Scouting Fleet, reports that the following ports of call are best suited for planes, such as F5L's and their tenders, making passage between Hampton Roads, Panama, and Guantanamo Bay:

Bocas del Toro, Panama; Tungwara Cay, Nicaragua; Miskito Cay, Honduras; Truxillo, Honduras; Belize, Br. Honduras; Cozumel Island, Yucatan; Cape Corrientes, Cuba; Cienfuegos, Cuba; Media Luna Cay, Cuba; Guantanamo Bay, Cuba; Mariel, Cuba; Key West, Fla.; Miami, Fla.; Fort Pierce and Titusville, Fla.; Fernandina, Fla.; Charleston, S. C.; Cape Lookout Bight, N. C.; Hampton Roads, Va. (Notice to Aviators No. 8, 1923)

Submarine Planes Now at Hampton Roads

Five MS-1 submarine planes made by the Glenn Martin Company of Cleveland have been received at the Naval Air Station, Hampton Roads, Va. They will be tested at that station before being issued for general use with the submarine flotillas.

The MS-1 is one of the smallest military seaplanes in the world. It is constructed with a metal framework. Together with the XS-1 seaplane of similar type, made by the Cox-Klemin Company of Garden City, L. I., N. Y., these planes will be stored on board the submarines of the Fleet. They are "de-mountable" and will be carried below deck. They will be used for scouting work in connection with submarine operations.

Naval Planes Find Racing Yachts Off Honolulu

Navy planes of the Aircraft Squadrons Battle Fleet now stationed at Pearl Harbor, Hawaii, engaged in a scouting problem on the occasion of a recent yacht race held off Honolulu. While the race was in progress torpedo planes were sent out to discover the location of the entries and report back. The winning yacht, "Mariner", was sighted in the lead while still sixty miles from Honolulu. Her name, location, direction and speed were sent back by radio. Photographs were also taken and the planes proceeded back to their station. Thus the winning yacht was known before it came in sight of Honolulu and photographs of her leading in the race were distributed while the race was still in progress.

This work is of greatest importance in the training of pilots in the scouting work so vital in time of war. To quote from a first hand account.

"It was all done so quietly and easily that it does not demand a great deal of foresight to see what may happen in future wars. As it was, when the yacht was sighted, the planes came down to welcome her, and friendly greetings were passed between the pilots of sea and air craft. But given war times and the search for enemy scouts instead of a friendly craft and the procedure would have been somewhat different. Once the enemy was sighted the torepdo planes would have sought safety behind convenient clouds or just over the horizon until early twilight. And then out of the semi-darkness the torpedo planes might steal in, only to be sighted by the enemy vessel when it would be too late."

COMING AERONAUTICAL EVENTS

DOMESTIC

Oct. 1-3 — National Airplane Races, St. Louis, Mo.
Late Fall — Curtiss Marine Flying Trophy Race

FOREIGN

Sept. 23 — Gordon Bennett Balloon Race, Brussels, Belgium
Sept. 28 — Schneider Maritime Aviation Trophy Race, Cowes, Isle of Wight, England
Dec. 1 — Entries close for French Engine competition

Aviators to Photograph Eclipse

In the hope of obtaining valuable astronomical data desired by the Naval Observatory at Washington, Navy fliers, co-operating with the experts of the Observatory, will make photographs at high altitudes of the eclipse of the sun on Sept. 10 which will be visible in Southern California.

The planes will fly from the Naval Air Station at San Diego, Calif. This is the first time observations of this kind have ever been made. In fact it is the first time that aviation has been called to help the science of astronomy.

The Naval planes will take the air with instruments and cameras just before the first phases of the eclipse are visible and will remain aloft during the entire period of the eclipse.

The planes will have a three-fold object. If the day is cloudy, the sun will not be visible to observers on the ground, and the aviators by flying over the clouds can obtain observations and photographs of great scientific value, which under these circumstances would constitute the only observations of the eclipse.

Another object is to take pictures of the shadow cast on the earth by the eclipse, and if possible to get photographs of both the northern and southern edges of it. With these photographs the exact center of the shadow can be and will constitute a means of checking the calculations of the scientists observing on the ground with telescopes. As the shadow will be moving at approximately 20 mi./hr., the airplane presents the most feasible way in which photographic records of it can be obtained. The southern edge of the shadow will first strike the coast line on the Pacific at a point in Mexico, about one hundred and fifty miles south of San Diego. The northern edge of it will pass over a point some twenty miles from San Diego.

This distance between the two edges will mean that the planes will have to be prepared for an extended flight. This item of distance together with the fact that the point in Mexico is in wild inaccessible territory on the uninhabited coast of Lower California, illustrates the value of the airplane in obtaining scientific data otherwise unobtainable.

The last and in many ways the most important object of the fliers will be to get photographs of the shadows immediately preceding the eclipse. These shadows have been observed by astronomers on the occasion of other eclipses but their cause has never been discovered.

By the means of aerial photographs, the relation of these shadows to the eclipse proper can be determined, it is thought, provided that a clue to the origin is found.

Navy Airship ZR1 Is Launched

The giant navy rigid airship ZR1, rose from its huge cradle in the hangar at the Lakehurst naval air station on Aug. 20 for the first time. Construction on the big airship started eighteen months ago and is now practically completed.

Comdr. R. O. Weybecker, who had charge of the assembling of the airship, supervised the launching. He was assisted by Station Comdr. R. F. McCreary and Capt. Antone Heine, consulting engineer, from Friedrichshafen, Germany.

The launching was accomplished by gradually releasing from the ballast tanks thirty-two ordinary water ballast bags, which hold, all told, eight tons of water. The ship's entire water ballast is twenty tons.

As the ship rose, 300 marines and sailors, detailed here as the permanent ground crew for the ZR1, guided the immense bag across the shed for a distance of 150 ft. There it was anchored and shed tests were begun.

When the launching was completed the first of the shed tests began. One of the 300 hp. Packard engines on one of the six gondolas was tuned and found to be operating perfectly. Each of the other gondolas also carries a 300 hp. engine. The tests will continue until the end of this month. The big airship probably will take the air on Sept. 1 for a test flight.

Only a few minor items are needed to make the ship complete. These include propellers, several coats of shellac and paint, and lacing. The bag is now 85 per cent inflated, holding 2,148,000 cu. ft. of helium gas. It is 680 ft. long and 78 ft. through.

Where to Fly

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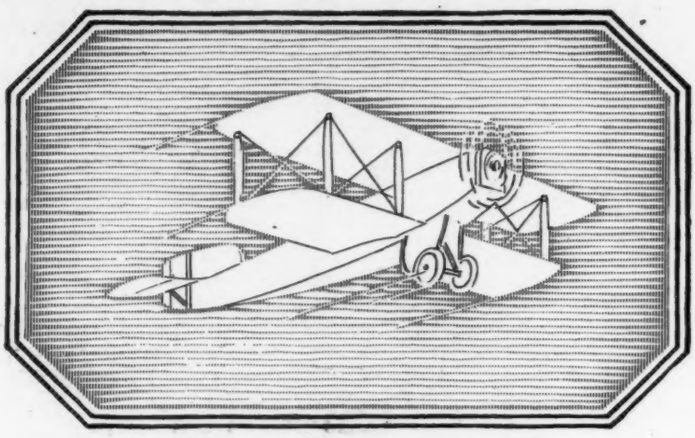

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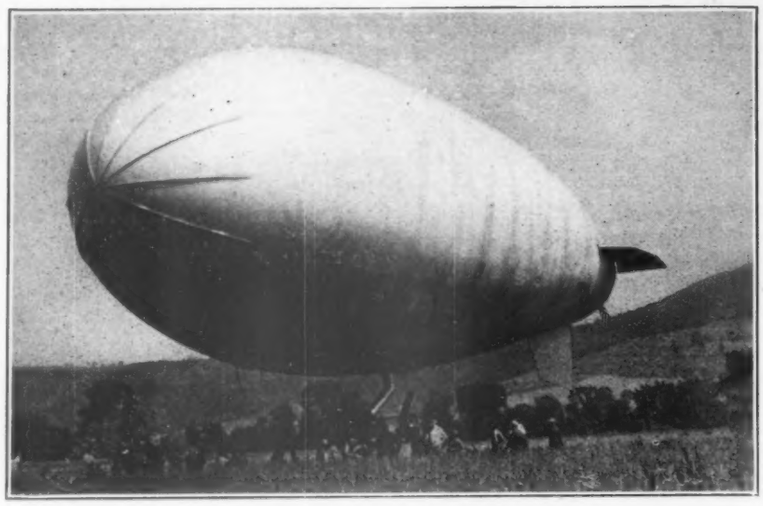

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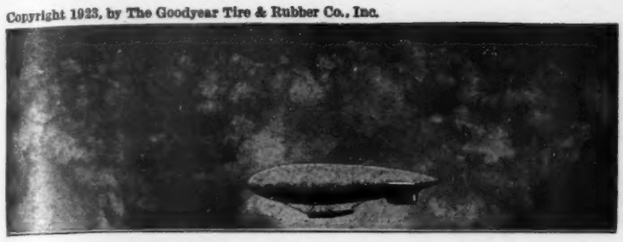

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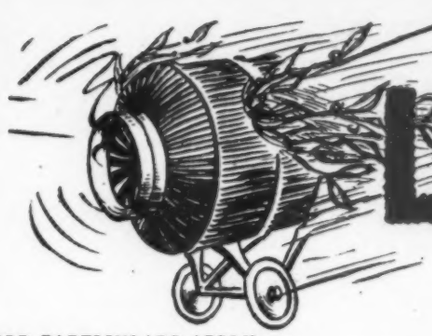

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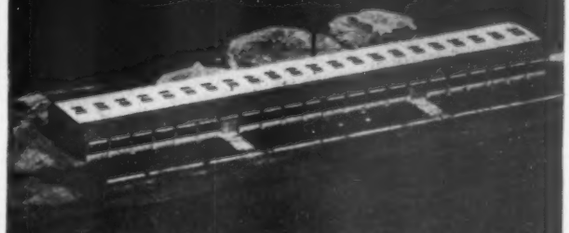

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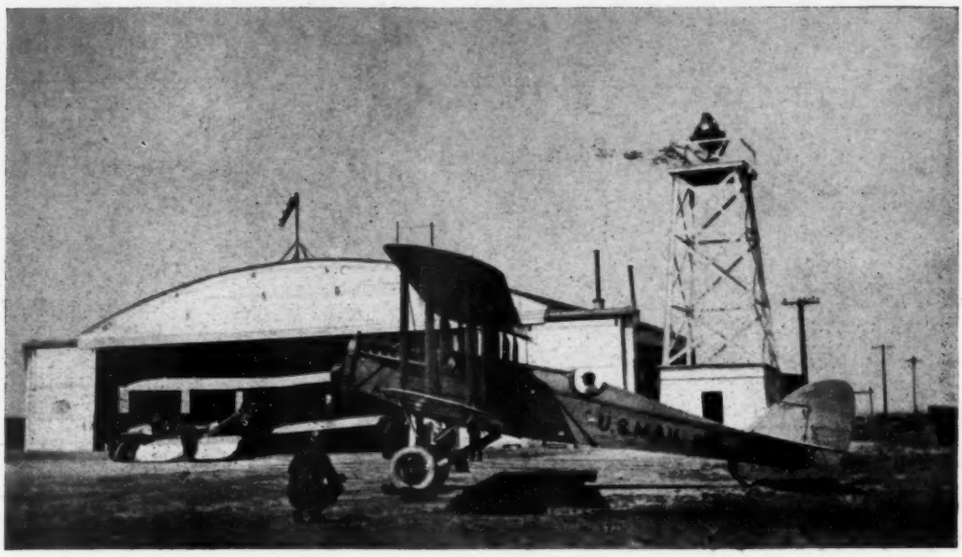

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